

86 8/4

## SEARCH REQUEST FORM

## Scientific and Technical Information Center

Requester's Full Name: BEN SACKEM Examiner #: 73489 Date: 2/14/03  
 Art Unit: 1620 Phone Number 305-6889 Serial Number: 09/713280  
 Mail Box and Bldg/Room Location: CWJ 3E71 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

MEJ

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: Process for the Manufacture of FurFural

Inventors (please provide full names): Karl J. Zeitsch and Hanna Epoli

Earliest Priority Filing Date: 2/11/99

\*For Sequence Searches Only\* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.

Process for manufacturing FurFural by charging a reactor with PENTOSAN containing material is heated to a temperature ( $T_1$ ) by introducing pressurized stream through a valve and subjecting the charge to gradual reduction of pressure until temperature ( $T_2$ ) is reached. Depressurization being at a rate sufficient to maintain the liquid phase within the reactor in a constant ebullient state.

Thanks

RECEIVED  
FEB 14 2003  
SAC/STIC

Jan Delaval  
Reference Librarian  
Biotechnology & Chemical Library  
CM1 1E07 - 703-308-4498  
jan.delaval@uspto.gov

\*\*\*\*\*  
STAFF USE ONLY

Searcher: Jane  
 Searcher Phone #: 4648  
 Searcher Location: \_\_\_\_\_  
 Date Searcher Picked Up: 2/16/03  
 Date Completed: 2/16/03  
 Searcher Prep & Review Time: \_\_\_\_\_  
 Clerical Prep Time: 10  
 Online Time: + 40

## Type of Search

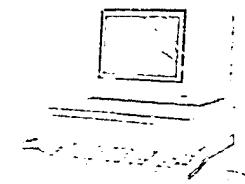
## Vendors and cost where applicable

NA Sequence (#)	STN	✓
AA Sequence (#)	Dialog	
Structure (#)	Questel/Orbit	
Bibliographic	Dr.Link	
Litigation	Lexis/Nexis	
Fulltext	Sequence Systems	
Patent Family	WWW/Internet	
Other	Other (specify)	

# BioTech-Chem Library

## Search Results

### Feedback Form (Optional)



Scientific & Technical Information Center

The search results generated for your recent request are attached. If you have any questions or comments (compliments or complaints) about the scope or the results of the search, please contact *the BioTech-Chem searcher* who conducted the search *or contact:*

**Mary Hale, Supervisor, 308-4258**  
CM-1 Room 1E01

---

#### ***Voluntary Results Feedback Form***

➤ *I am an examiner in Workgroup:*                   (Example: 1610)

➤ *Relevant prior art found, search results used as follows:*

- 102 rejection
- 103 rejection
- Cited as being of interest.
- Helped examiner better understand the invention.
- Helped examiner better understand the state of the art in their technology.

*Types of relevant prior art found:*

- Foreign Patent(s)
- Non-Patent Literature  
(Journal articles, conference proceedings, new product announcements etc.)

➤ *Relevant prior art not found:*

- Results verified the lack of relevant prior art (helped determine patentability).
- Search results were not useful in determining patentability or understanding the invention.

**Other Comments:**

---

Drop off completed forms at the Circulation Desk CM-1, or send to Mary Hale, CM1-1E01 or e-mail [mary.hale@uspto.gov](mailto:mary.hale@uspto.gov).

=> fil reg  
FILE 'REGISTRY' ENTERED AT 17:02:22 ON 16 FEB 2003  
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.  
PLEASE SEE "HELP USAGETERMS" FOR DETAILS.  
COPYRIGHT (C) 2003 American Chemical Society (ACS)

Jan Delaval,  
Reference Librarian  
Biotechnology & Chemical Library  
CMR 11:07 - 703-303-4488  
Jan.Delaval@uspto.gov

Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 14 FEB 2003 HIGHEST RN 490576-14-2  
DICTIONARY FILE UPDATES: 14 FEB 2003 HIGHEST RN 490576-14-2

#### TSCA INFORMATION NOW CURRENT THROUGH MAY 20, 2002

Please note that search-term pricing does apply when conducting SmartSELECT searches.

Crossover limits have been increased. See HELP CROSSOVER for details.

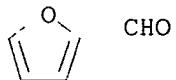
Experimental and calculated property data are now available. See HELP PROPERTIES for more information. See STNote 27, Searching Properties in the CAS Registry File, for complete details:

<http://www.cas.org/ONLINE/STN/STNOTES/stnotes27.pdf>

=> d ide can 11

L1 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS  
RN 98-01-1 REGISTRY  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)  
OTHER CA INDEX NAMES:  
CN 2-Furaldehyde (8CI)  
OTHER NAMES:  
CN .alpha.-Furole  
CN 2-Formylfuran  
CN 2-Furanaldehyde  
CN 2-Furancarbaldehyde  
CN 2-Furancarbonal  
CN 2-Furfural  
CN 2-Furfuraldehyde  
CN 2-Furylaldehyde  
CN 2-Furylcarboxaldehyde  
CN Artificial ant oil  
CN Fural  
CN Furaldehyde  
CN Furancarbonal  
CN **Furfural**  
CN Furfuraldehyde  
CN Furfurol  
CN Furfurole  
CN Furfurylaldehyde  
CN Furole  
CN Pyromucic aldehyde  
FS 3D CONCORD  
MF C5 H4 O2  
CI COM  
LC STN Files: AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN\*, BIOBUSINESS, BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CHEMSAFE, CIN, CSCHEM, CSNB, DDFU, DETHERM\*, DIPPR\*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2, GMELIN\*, HODOC\*, HSDB\*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK\*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM\*, PIRA, PROMT, RTECS\*, SPECINFO, TOXCENTER, TULSA, ULIDAT, USPAT2, USPATFULL, VTB  
(\*File contains numerically searchable property data)

Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*  
 (\*\*Enter CHEMLIST File for up-to-date regulatory information)



\*\*PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT\*\*

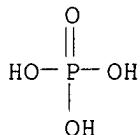
14415 REFERENCES IN FILE CA (1962 TO DATE)  
 331 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 14429 REFERENCES IN FILE CAPIUS (1962 TO DATE)  
 10 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 138:109279  
 REFERENCE 2: 138:108624  
 REFERENCE 3: 138:108621  
 REFERENCE 4: 138:108592  
 REFERENCE 5: 138:106850  
 REFERENCE 6: 138:106653  
 REFERENCE 7: 138:106627  
 REFERENCE 8: 138:106573  
 REFERENCE 9: 138:106572  
 REFERENCE 10: 138:106569

=> d ide can 12

L2 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS  
 RN 7664-38-2 REGISTRY  
 CN **Phosphoric acid (7CI, 8CI, 9CI)** (CA INDEX NAME)  
 OTHER NAMES:  
 CN 3M Etching Liquid  
 CN Amberphos 54  
 CN C 134  
 CN C 134 (acid)  
 CN C 434  
 CN C 434 (acid)  
 CN Conditioner 36  
 CN Decon 4512  
 CN EVITs  
 CN HQ 54  
 CN K-etchant  
 CN Kefo  
 CN Mikro Klene DF  
 CN Orthophosphoric acid  
 CN Panavia Etching Agent  
 CN Sonac  
 CN SPA 2  
 CN SPA 2 (catalyst)  
 CN TG 434

CN Ultra-Etch Gel  
 CN Ultraetch  
 CN Uni-Etch  
 CN WC-Reiniger  
 FS 3D CONCORD  
 DR 28602-75-7, 178560-73-1  
 MF H3 O4 P  
 CI COM  
 LC STN Files: AGRICOLA, ANABSTR, AQUIRE, BIOBUSINESS, BIOSIS, BIOTECHNO,  
     CA, CABAB, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB, CEN, CHEMCATS,  
     CHEMINFORMRX, CHEMLIST, CIN, CSCHEM, CSNB, DDFU, DETHERM\*, DIOGENES,  
     DIPPR\*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2, ENCOMPPAT, ENCOMPPAT2,  
     GMELIN\*, HSDB\*, IFICDB, IFIPAT, IFIUDB, IPA, MEDLINE, MRCK\*, MSDS-OHS,  
     NAPRALERT, NIOSHTIC, PDLCOM\*, PIRA, PROMT, RTECS\*, SPECINFO, TOXCENTER,  
     TULSA, ULIDAT, USAN, USPAT2, USPATFULL, VETU, VTB  
     (\*File contains numerically searchable property data)  
 Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*  
     (\*\*Enter CHEMLIST File for up-to-date regulatory information)



\*\*PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT\*\*

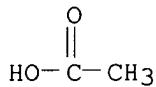
47491 REFERENCES IN FILE CA (1962 TO DATE)  
 6940 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 47526 REFERENCES IN FILE CAPLUS (1962 TO DATE)  
 1 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 138:116680  
 REFERENCE 2: 138:116435  
 REFERENCE 3: 138:116379  
 REFERENCE 4: 138:116368  
 REFERENCE 5: 138:116359  
 REFERENCE 6: 138:115135  
 REFERENCE 7: 138:114853  
 REFERENCE 8: 138:114004  
 REFERENCE 9: 138:114001  
 REFERENCE 10: 138:113990

=> d ide can 13

L3 ANSWER 1 OF 1 REGISTRY COPYRIGHT 2003 ACS  
 RN 64-19-7 REGISTRY  
 CN Acetic acid (7CI, 8CI, 9CI) (CA INDEX NAME)  
 OTHER NAMES:  
 CN acetic acid

CN Aci-Jel  
 CN Ethanoic acid  
 CN Ethanoic acid monomer  
 CN Ethylic acid  
 CN Glacial acetic acid  
 CN Methanecarboxylic acid  
 CN Vinegar acid  
 FS 3D CONCORD  
 DR 77671-22-8  
 MF C2 H4 O2  
 CI COM  
 LC STN Files: ADISNEWS, AGRICOLA, ANABSTR, AQUIRE, BEILSTEIN\*, BIOBUSINESS,  
     BIOSIS, BIOTECHNO, CA, CABA, CANCERLIT, CAOLD, CAPLUS, CASREACT, CBNB,  
     CEN, CHEMCATS, CHEMINFORMRX, CHEMLIST, CHEMSAFE, CIN, CSCHEM, CSNB,  
     DDFU, DETHERM\*, DIOGENES, DIPPR\*, DRUGU, EMBASE, ENCOMPLIT, ENCOMPLIT2,  
     ENCOMPPAT, ENCOMPPAT2, GMELIN\*, HODOC\*, HSDB\*, IFICDB, IFIPAT, IFIUDB,  
     IPA, MEDLINE, MRCK\*, MSDS-OHS, NAPRALERT, NIOSHTIC, PDLCOM\*, PIRA,  
     PROMT, RTECS\*, SPECINFO, TOXCENTER, TULSA, ULIDAT, USAN, USPAT2,  
     USPATFULL, VETU, VTB  
         (\*File contains numerically searchable property data)  
 Other Sources: DSL\*\*, EINECS\*\*, TSCA\*\*  
         (\*\*Enter CHEMLIST File for up-to-date regulatory information)



\*\*PROPERTY DATA AVAILABLE IN THE 'PROP' FORMAT\*\*

71278 REFERENCES IN FILE CA (1962 TO DATE)  
 3550 REFERENCES TO NON-SPECIFIC DERIVATIVES IN FILE CA  
 71355 REFERENCES IN FILE CAPLUS (1962 TO DATE)  
 2 REFERENCES IN FILE CAOLD (PRIOR TO 1967)

REFERENCE 1: 138:117012  
 REFERENCE 2: 138:116718  
 REFERENCE 3: 138:116435  
 REFERENCE 4: 138:116280  
 REFERENCE 5: 138:113995  
 REFERENCE 6: 138:113164  
 REFERENCE 7: 138:113064  
 REFERENCE 8: 138:112932  
 REFERENCE 9: 138:112787  
 REFERENCE 10: 138:112590

=> d his

SET COST OFF

FILE 'REGISTRY' ENTERED AT 16:42:06 ON 16 FEB 2003

E FURFURAL/CN

L1 1 S E3

L2 1 S PHOSPHORIC ACID/CN

L3 1 S ACETIC ACID/CN

FILE 'HCAPLUS' ENTERED AT 16:43:08 ON 16 FEB 2003

L4 14433 S L1

L5 18796 S FURFURAL

L6 8325 S FURALDEHYDE OR FURFURALDEHYDE OR FURFUROL# OR FUROLE OR ALPHA

L7 1207 S 2()(FURANCARBALDEHYDE OR FURANCARBONAL OR FURFURAL OR FURFURA

L8 1863 S 2 FURANCARBOXALDEHYDE

L9 158 S FURAN 2 CARBOXALDEHYDE

L10 24 S FURFURLALDEHYDE

L11 25 S 2 FURAN CARBOXALDEHYDE

L12 9 S 2 FURYL ALDEHYDE

L13 51 S FURAN 2 ALDEHYDE

L14 28529 S L4-L13

L15 817 S L14 AND PENTOSAN?

E PENTOSAN/CT

E E5+ALL

L16 1348 S E4

L17 172 S L14 AND L16

L18 817 S L15,L17

L19 110 S L18 AND ?PRESSUR?

L20 152 S L1/P AND L18

L21 30 S L20 AND L19

L22 38 S L20 AND STEAM?

L23 22 S L20 AND (?VAPOR? OR ?VAPOUR?)

L24 57 S L20 AND (TEMPERATURE OR HEAT? OR THERM?)

L25 85 S L21-L24

L26 1 S L25 AND DEPRESSUR?

E REACTOR/CT

L27 58 S E9+NT AND L14

L28 8 S L27 AND ?PRESSUR?

SEL DN AN 1 6

L29 2 S E1-E6

L30 610 S L14 AND ?SACCHARIDE?

E POLYSACCHARIDES/CT

E E3+ALL

L31 127 S E4,E3 AND L14

L32 1353 S L18,L30,L31

L33 241 S L32 AND L1/P

L34 39 S L33 AND ?PRESSUR?

L35 23 S L34 AND (STEAM? OR ?VAPOR? OR ?VAPOUR?)

L36 24 S L26,L29,L35

L37 3 S L36 AND (L2 OR L3 OR PHOSPHORIC ACID OR ACETIC ACID OR H<sub>2</sub>PO<sub>4</sub>)

L38 15 S L36 AND ?HEAT?

L39 15 S L34 AND ?STEAM?

L40 24 S L36-L39

E ZEITSCH K/AU

L41 33 S E3-E9

E EPOPL H/AU

L42 8 S L41 AND L14

L43 7 S L1/P AND L42

L44 29 S L40,L43

L45 1 S L42 NOT L44

L46 30 S L44,L45

L47 30 S L46 AND (?STEAM? OR ?HEAT? OR TEMPERATURE OR ?THERM? OR ?STEA

L48 6 S L47 AND (?BOIL? OR EBULL?)

L49 1 S L47 AND ?COMPRES?

L50 30 S L47-L49  
 L51 30 S L50 AND L4-L50  
 SEL HIT RN

FILE 'REGISTRY' ENTERED AT 17:01:41 ON 16 FEB 2003  
 L52 2 S E1-E2

FILE 'REGISTRY' ENTERED AT 17:02:22 ON 16 FEB 2003

=> fil hcaplus  
 FILE 'HCAPLUS' ENTERED AT 17:02:37 ON 16 FEB 2003  
 USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.  
 PLEASE SEE "HELP USAGETERMS" FOR DETAILS.  
 COPYRIGHT (C) 2003 AMERICAN CHEMICAL SOCIETY (ACS)

Copyright of the articles to which records in this database refer is held by the publishers listed in the PUBLISHER (PB) field (available for records published or updated in Chemical Abstracts after December 26, 1996), unless otherwise indicated in the original publications. The CA Lexicon is the copyrighted intellectual property of the American Chemical Society and is provided to assist you in searching databases on STN. Any dissemination, distribution, copying, or storing of this information, without the prior written consent of CAS, is strictly prohibited.

FILE COVERS 1907 - 16 Feb 2003 VOL 138 ISS 8  
 FILE LAST UPDATED: 14 Feb 2003 (20030214/ED)

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d 151 all hitstr tot

L51 ANSWER 1 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
 AN 2002:220569 HCAPLUS  
 DN 136:249386  
 TI Gaseous acid catalysis  
 IN Zeitsch, Karl J.  
 PA Buzzard, Jonathan Leighton, S. Afr.; Steiner, Philipp D.  
 SO PCT Int. Appl., 14 pp.  
 CODEN: PIXXD2  
 DT Patent  
 LA English  
 IC ICM C07D307-50  
 CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2002022593	A1	20020321	WO 2001-ZA146	20010914
	W:	AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
	DE 10045465	A1	20020328	DE 2000-10045465	20000914
	AU 2002024485	A5	20020326	AU 2002-24485	20010914
PRAI	DE 2000-10045465	A	20000914		

WO 2001-ZA146 W 20010914

AB A method of **gaseous** acid catalysis which finds particular applications in the manuf. of **furfural** includes the steps of introducing a solid **reactant** contg. .gtoreq.1 hydroxyl groups into a **reactor** (1); introducing **superheated steam** from a **superheater** (2) until the **temp.** within the **reactor** (1) is higher than that of the dew points of both water and the catalyst and the **reactant** is dry. The catalyst is then introduced into the **superheated steam** by **vaporizer** (3). Product **gas** formed is liquefied in condenser (4) and the condensate collected in a buffer tank (5). Sepn. plant 6 isolates the product **gas** and recovers the acid catalyst, preferably as its azeotrope with water, and recycles it into the **vaporizer**.

ST **gaseous** acid catalyst **furfural** prepn

IT Hydrolysis

(acid; **gaseous** acid catalysis)

IT Hydrolysis catalysts

(**gaseous** acid catalysis)IT Carbohydrates, **reactions****Pentosans**RL: RCT (Reactant); RACT (Reactant or reagent)  
(**gaseous** acid catalysis)IT 7647-01-0, Hydrochloric acid, uses  
RL: CAT (Catalyst use); USES (Uses)  
(**gaseous** acid catalysis)IT 98-01-1P, **Furfural**, preparationRL: IMF (Industrial manufacture); PREP (Preparation)  
(**gaseous** acid catalysis)IT 57-50-1, Sugar, **reactions** 53106-52-8, **Pentose**  
199297-32-0, **Pentose**RL: RCT (Reactant); RACT (Reactant or reagent)  
(**gaseous** acid catalysis)

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

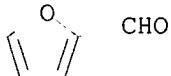
(1) Hamada, K; US 4154744 A 1979 HCPLUS

(2) Wells, P; US 4001283 A 1977 HCPLUS

IT 98-01-1P, **Furfural**, preparationRL: IMF (Industrial manufacture); PREP (Preparation)  
(**gaseous** acid catalysis)

RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 2 OF 30 HCPLUS COPYRIGHT 2003 ACS

AN 2001:28054 HCPLUS

DN 134:224289

TI **Gaseous** acid catalysis: An intriguing new process

AU Zeitsch, Karl J.

CS Koln, D-50935, Germany

SO Chemical Innovation (2001), 31(1), 40-44

CODEN: CINNFJ; ISSN: 1527-4799

PB American Chemical Society

DT Journal

LA English

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

Section cross-reference(s): 67

AB A gaseous acid catalysis process for the prodn. of furfural from sugars (**pentose or pentosan**) using a H<sub>2</sub>O-HCl azeotrope is reported.

ST sugar dehydration water hydrochloric acid azeotrope; **furfural** prodn **gaseous** acid catalysis; hydrogen chloride water **gas** acid catalyst

IT Catalysis  
 (acid, **gaseous**; **gaseous** acid catalysis process  
 prodn. of **furfural** from **pentose or pentosan**  
 )

IT Water vapor  
 (**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)

IT 199297-32-0, Pentose  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (**gaseous** acid catalysis process prodn. of **furfural** from **pentose or pentosan**)

IT 7647-01-0, Hydrogen chloride, uses 7732-18-5, Water, uses  
 RL: CAT (Catalyst use); PRP (Properties); USES (Uses)  
 (**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)

IT 98-01-1P, Furfural, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)

RE.CNT 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD

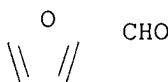
RE

- (1) Bacelo, D; J Phys Chem 1999, V103, P4631 HCPLUS
- (2) Cobine, J; Gaseous Conductors 1958
- (3) Coulson, C; Valence 1965
- (4) Mason, S; Chemical Evolution 1992
- (5) Pohl, R; Elektrizitätslehre 1967
- (6) Saha, M; Phil Mag 1920, V40, P472
- (7) Zeitsch, K; Chem Innov 2000, V30(4), P29 HCPLUS
- (8) Zeitsch, K; German Patent Application 100454658 2000
- (9) Zeitsch, K; The Chemistry and Technology of Furfural and Its Many By-Products 2000

IT 98-01-1P, Furfural, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (**gaseous** hydrogen chloride-water catalyzed prodn. of **furfural** from **pentose**)

RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 3 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 2000:738782 HCPLUS  
 DN 133:298016  
 TI Procedure for the **gas**-phase production of **furfural** from the **pentoses** contained in sulfite waste pulping liquors using **steam** injection  
 IN Zeitsch, Karl  
 PA Germany  
 SO Ger. Offen., 4 pp.  
 CODEN: GWXXBX  
 DT Patent  
 LA German

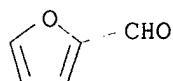
IC ICM C07D307-48  
ICS C07D307-50

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 27, 43, 48

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 19917178	A1	20001019	DE 1999-19917178	19990416
	WO 2000063488	A1	20001026	WO 2000-ZA72	20000414
	W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
	RW:	GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
	BR 2000009815	A	20020108	BR 2000-9815	20000414
	EP 1171665	A1	20020116	EP 2000-940001	20000414
	R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO			
	NO 2001005031	A	20011211	NO 2001-5031	20011016
PRAI	DE 1999-19917178	A	19990416		
	WO 2000-ZA72	W	20000414		
AB	<b>Furfural</b> is prep'd. in high yield and selectivity from the <b>gas-phase reaction of pentoses</b> found in sulfite waste liquors which are heated by <b>steam</b> injection in a tubular reactor, the low-boiling products distd. and furfural removed, and the residue cooled by depressurization. A process flow diagram is presented.				
ST	<b>furfural</b> manuf sulfite waste liquor <b>steam</b> injection; <b>pentose</b> sulfite waste liquor conversion prepn <b>furfural</b> ; pulping liquor sulfite manuf <b>furfural</b>				
IT	<b>Steam</b> (procedure for the <b>gas-phase</b> prodn. of <b>furfural</b> from the <b>pentoses</b> contained in sulfite waste liquors using <b>steam</b> injection)				
IT	<b>Distillation</b> (procedure for the <b>gas-phase</b> prodn. of <b>furfural</b> from the <b>pentoses</b> contained in sulfite waste liquors using <b>steam</b> injection and)				
IT	<b>Pentoses</b> RL: RCT (Reactant); RACT (Reactant or reagent) (sulfite waste liquor-contg.; procedure for the <b>gas-phase</b> prodn. of <b>furfural</b> from the <b>pentoses</b> contained in sulfite waste liquors using <b>steam</b> injection)				
IT	<b>Pulping liquors, reactions</b> RL: RCT (Reactant); RACT (Reactant or reagent) (sulfite, <b>pentose</b> -contg.; procedure for the <b>gas</b> -phase prodn. of <b>furfural</b> from the <b>pentoses</b> contained in sulfite waste liquors using <b>steam</b> injection)				
IT	7439-97-6, Mercury, processes RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses) (procedure for the <b>gas-phase</b> prodn. of <b>furfural</b> from the <b>pentoses</b> contained in sulfite waste liquors using <b>steam</b> injection)				
IT	98-01-1P, <b>Furfural</b> , preparation RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process) (procedure for the <b>gas-phase</b> prodn. of <b>furfural</b> from the <b>pentoses</b> contained in sulfite waste liquors using				

steam injection)  
IT 98-01-1P, Furfural, preparation  
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)  
(procedure for the gas-phase prodn. of furfural  
from the pentoses contained in sulfite waste liquors using  
steam injection)  
RN 98-01-1 HCAPLUS  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 4 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
AN 2000:573784 HCAPLUS  
DN 133:165426  
TI Process for the manufacture of furfural  
IN Zeitsch, Karl J.  
PA Steiner, Philipp Daniel, S. Afr.  
SO PCT Int. Appl., 15 pp.  
CODEN: PIXXD2  
DT Patent  
LA English  
IC ICM C07D307-50  
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 27

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000047569	A1	20000817	WO 2000-ZA24	20000211
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG	
	DE 19905655	A1	20000817	DE 1999-19905655	19990211
	EP 1161426	A1	20011212	EP 2000-912231	20000211
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	BR 2000008143	A	20020312	BR 2000-8143	20000211
PRAI	DE 1999-19905655	A	19990211		
	WO 2000-ZA24	W	20000211		
AB	The process is carried out by charging a reactor with pentosan-contg. material, heating by introduction of pressurized steam to a 1st predetd. temp. closing the inlet valve of the reactor, and subjecting the charge to a gradual redn. of pressure until a 2nd predetd. temp. is attained, the depressurization being at a rate sufficient to maintain the liq. phase within the reactor in a constantly ebullient state. An illustration of the delayed decompression process for the prodn. of furfural is given.				
ST	conversion pentosan furfural; decompression process prodn furfural				
IT	Reactors				

(process for the manuf. of furfural)

IT **Pentosans**

RL: RCT (Reactant); RACT (Reactant or reagent)

(process for the manuf. of furfural)

IT **98-01-1P, Furfural, preparation**

RL: IMF (Industrial manufacture); PREP (Preparation)

(process for the manuf. of furfural)

RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Bertin &amp; Cie; WO 8100407 A 1981 HCPLUS

(2) F S Market Spol S R O; WO 9625553 A 1996 HCPLUS

(3) Friedr Krupp Gmbh; DE 3842825 A 1989 HCPLUS

(4) Jednote Zemedelske Druzstvo Jana Cerneho Se Sidlem; EP 0346836 A 1989 HCPLUS

(5) Kiminki, K; US 4029515 A 1977 HCPLUS

(6) Knauth, H; DE 3139188 C 1983 HCPLUS

(7) Krasd Poly; SU 1225841 A 1986 HCPLUS

(8) Medeiros, D; US 4533743 A 1985 HCPLUS

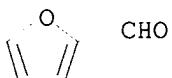
IT **98-01-1P, Furfural, preparation**

RL: IMF (Industrial manufacture); PREP (Preparation)

(process for the manuf. of furfural)

RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 5 OF 30 HCPLUS COPYRIGHT 2003 ACS

AN 2000:369496 HCPLUS

DN 132:336083

TI Manufacture of furfurol and acetic acid from plant sources

IN Vedernikovs, Nikolajs

PA Latvia

SO Latv., 15 pp.

CODEN: LAXXF6

DT Patent

LA Russian

IC ICM C07D307-50

ICS C07C053-08

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 27

FAN.CNT 1

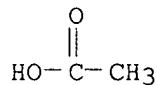
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	LV 12131	B	19981120	LV 1997-230	19971114
PRAI	LV 1997-230		19971114		

AB The title compds. are manufd. by treating comminuted plant sources contg. **pentosans**, e.g., hardwood, corn stalks, sunflower seed shells, etc., with **superheated steam** at 200-250.degree. under **pressure** (0.7-1.4 MPa), in the presence of inorg. salts comprising cations having charge .gtoreq.2, specifically ZnSO<sub>4</sub> and/or Al<sub>2</sub>(SO<sub>4</sub>)<sub>3</sub>. The amts. of inorg. salt catalyst, are reduced by use of salt solns. with satn. degree 20-90% in an amt. of .ltoreq.15% based on dry plant material.

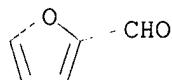
ST **furfurol** manuf **pentosan** contg plant; corn stalk  
**furfurol** manuf zinc aluminum sulfate catalyst

IT Straw  
Straw  
(corn; manuf. of furfurol and acetic acid)

from plant sources contg. **pentosans**)  
IT **Pentosans**  
RL: MSC (Miscellaneous)  
(manuf. of **furfurol** and **acetic acid** from  
plant sources contg.)  
IT Corn  
Corn  
(straw; manuf. of **furfurol** and **acetic acid**  
from plant sources contg. **pentosans**)  
IT **Steam**  
(superheated; manuf. of **furfurol** and **acetic acid**  
from plant sources contg. **pentosans**)  
IT 7733-02-0, Zinc sulfate 10043-01-3, Aluminum sulfate  
RL: CAT (Catalyst use); USES (Uses)  
(manuf. of **furfurol** and **acetic acid** from  
plant sources contg. **pentosans**)  
IT 64-19-7P, **Acetic acid**, preparation  
98-01-1P, **Furfurol**, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manuf. of **furfurol** and **acetic acid** from  
plant sources contg. **pentosans**)  
IT 64-19-7P, **Acetic acid**, preparation  
98-01-1P, **Furfurol**, preparation  
RL: IMF (Industrial manufacture); PREP (Preparation)  
(manuf. of **furfurol** and **acetic acid** from  
plant sources contg. **pentosans**)  
RN 64-19-7 HCPLUS  
CN Acetic acid (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 98-01-1 HCPLUS  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 6 OF 30 HCPLUS COPYRIGHT 2003 ACS  
AN 2000:254501 HCPLUS  
DN 133:6139  
TI **Furfural** production needs chemical innovation  
AU Zeitsch, Kark J.  
CS Koln, Germany  
SO Chemical Innovation (2000), 30(4), 29-32  
CODEN: CINNFJ; ISSN: 1527-4799  
PB American Chemical Society  
DT Journal  
LA English  
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
AB A consideration regarding an increase of **furfural** yield in  
industrial prodn. is given. Yields of **furfural** approaching 100%  
can be obtained by avoiding H<sub>2</sub>SO<sub>4</sub> to prevent sulfonation losses and by  
bringing the system to **boiling** and maintaining this state  
throughout the digestion process.  
ST **furfural** yield industrial manuf sulfuric acid; **pentose**

IT redn furancarboxaldehyde process optimization  
 IT 98-01-1P, Furfural, preparation  
   RL: IMF (Industrial manufacture); PREP (Preparation)  
     (increasing furfural yield in industrial prodn.)  
 IT 7664-93-9, Sulfuric acid, uses  
   RL: NUU (Other use, unclassified); USES (Uses)  
     (increasing furfural yield in industrial prodn.)  
 IT 199297-32-0, Pentose  
   RL: PEP (Physical, engineering or chemical process); RCT (Reactant); PROC  
     (Process); RACT (Reactant or reagent)  
     (increasing furfural yield in industrial prodn.)

RE.CNT 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

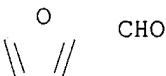
- (1) Brownlee, H; Ind Eng Chem 1927, V19, P422 HCPLUS
- (2) Brownlee, H; Ind Eng Chem 1948, V40, P201 HCPLUS
- (3) Cox, W; Fearsome Creatures of the Lumberwoods 1984
- (4) Dehn, W; J Am Chem Soc 1933, V55, P4284 HCPLUS
- (5) Derbyshire, V; Proc Natl Acad Sci USA 1998, V95, P1356 HCPLUS
- (6) Evans, D; J Am Chem Soc 1975, V97, P4765 HCPLUS
- (7) Evans, D; J Am Chem Soc 1978, V100, P2742
- (8) Haseltine, J; J Am Chem Soc 1989, V111, P7638 HCPLUS
- (9) Hughes, E; J Res Natl Bur Stand 1938, V21, P327 HCPLUS
- (10) Hurd, C; J Am Chem Soc 1932, V54, P317 HCPLUS
- (11) Kishore, N; J Chem Thermodyn 1999, V31, P211 HCPLUS
- (12) Perler, F; Nucleic Acids Res 1994, V22, P1125 HCPLUS
- (13) Perler, F; Nucleic Acids Res, www.neb.com/inteins/int\_mech.html 2000, V28, P344 HCPLUS
- (14) Root, D; For Prod J 1959, V9, P158 HCPLUS
- (15) Sabongi, G; Chemical Triggering 1987
- (16) Smith, A; J Med Chem 1996, V39, P2103 HCPLUS
- (17) Stryer, L; Biochemistry 4th ed 1995, P864
- (18) Vollmert, B; Polymer Chemistry V197, P34
- (19) Woodward, R; Perspectives in Organic Chemistry 1956, P176
- (20) Zeitsch, K; German patent application 19905655.2 1999
- (21) Zeitsch, K; PCT patent application 2A00/00024 2000

IT 98-01-1P, Furfural, preparation

  RL: IMF (Industrial manufacture); PREP (Preparation)  
     (increasing furfural yield in industrial prodn.)

RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 7 OF 30 HCPLUS COPYRIGHT 2003 ACS

AN 2000:177281 HCPLUS

DN 132:309937

TI Fortuitous radical reactions in furfural and charcoal reactors

AU Zeitsch, Karl J.

CS Cologne, D-50935, Germany

SO Chemical Innovation (2000), 30(3), 35-38  
 CODEN: CINNFJ; ISSN: 1527-4799

PB American Chemical Society

DT Journal; General Review

LA English

CC 45-0 (Industrial Organic Chemicals, Leather, Fats, and Waxes)

AB A review with 6 refs. on formation of byproducts of diacetyl and 2,3-pentanedione by radical reactions in furfural

ST prepn., and charcoal **reactors** used in this process.  
IT review **furfural charcoal reactor**  
IT Charcoal  
RL: MSC (Miscellaneous)  
(fortuitous radical **reactions** in **furfural** and  
charcoal **reactors**)  
IT 98-01-1, **Furfural**, miscellaneous  
RL: MSC (Miscellaneous)  
(fortuitous radical **reactions** in **furfural** and  
charcoal **reactors**)  
RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD  
RE  
(1) Blacet, F; Discuss Faraday Soc 1973, V14, P70  
(2) Franz, G; Ullmann's Encyclopedia of Industrial Chemistry, 5th ed 1991,  
VA18, P261  
(3) Hagglund, E; Chemistry of Wood 1951, P190  
(4) Hobbs, C; Kirk-Othmer Encyclopedia of Chemical Technology, 4th ed 1998,  
V13, P682  
(5) Larkin, D; J Org Chem 1990, V55, P1563 HCPLUS  
(6) McDowell, C; J Chem Soc 1949, P2208 HCPLUS  
IT 98-01-1, **Furfural**, miscellaneous  
RL: MSC (Miscellaneous)  
(fortuitous radical **reactions** in **furfural** and  
charcoal **reactors**)  
RN 98-01-1 HCPLUS  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 8 OF 30 HCPLUS COPYRIGHT 2003 ACS  
AN 1999:589078 HCPLUS  
DN 131:259286  
TI Extractive Condensation: A New Separation Process  
AU Zeitsch, K. J.  
CS Cologne, D-50935, Germany  
SO Industrial & Engineering Chemistry Research (1999), 38(10), 4123-4124  
CODEN: IECRED; ISSN: 0888-5885  
PB American Chemical Society  
DT Journal  
LA English  
CC 48-1 (Unit Operations and Processes)  
AB A new highly selective **vapor**-phase extn. process is described.  
Hydrogen bonding between a scavenging extractant and the substance to be  
extd. results in a high-boiling complex forming fog droplets  
readily separable from the remaining **vapor**. The process is  
exemplified by the extn. of acetic acid from the predominantly aq.  
**vapor** stream of **furfural reactors**.  
Triethylamine is used as the extractant.  
ST extractive condensation acetic acid **furfural** triethylamine  
IT Condensation (physical)  
Extraction  
(extractive condensation in acetic acid extn. from aq. **vapor**  
stream of **furfural** using triethylamine)  
IT 121-44-8, Triethylamine, uses  
RL: MOA (Modifier or additive use); USES (Uses)  
(extn. of acetic acid from aq. **vapor** stream of  
**furfural** using triethylamine by extractive condensation)  
IT 64-19-7P, Acetic acid, preparation 98-01-1P, **Furfural**,

## preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
 (extn. of acetic acid from aq. **vapor** stream of  
**furfural** using triethylamine by extractive condensation)

RE.CNT 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) March, J; Advanced Organic Chemistry 1992

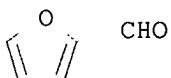
(2) Zeitsch, K; DE 40251284 P 1990

IT 98-01-1P, **Furfural**, preparation

RL: PUR (Purification or recovery); PREP (Preparation)  
 (extn. of acetic acid from aq. **vapor** stream of  
**furfural** using triethylamine by extractive condensation)

RN 98-01-1 HCAPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 9 OF 30 HCAPLUS COPYRIGHT 2003 ACS

AN 1998:716425 HCAPLUS

DN 129:277653

TI Process for producing of **furfural** and **acetic acid**

IN Vedernikovs, Nikolajs

PA Latvia

SO Latv., 11 pp.

CODEN: LAXXF6

DT Patent

LA Russian

IC C07D307-50; C07C053-08

CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
 Section cross-reference(s): 43

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI LV 11950	B	19980320	LV 1995-310	19951012
PRAI LV 1995-310		19951012		

AB With the aim to reduce the amt. of the catalyst and improve environmental friendliness of the process, a new catalyst compn. is disclosed for **furfural** and **acetic acid** prodn. from **pentosan**-contg. vegetable raw material, i.e., corncob, comminuted wood or sawdust. The catalyst is an aq. soln. contg. 0.3-5.0% a carboxylic acid, 0.5-75.0% sulfuric acid, and/or 0.2-35.0% a salt or salt mixt., contg. cations with a charge .gtoreq. 2 (aluminum or zinc sulfates). The overall amt. of the catalyst is .ltoreq. 20 wt. % dry raw material. The raw material is sprinkled with the catalyst soln. and treated with water **vapor** in a continuous or periodic reactor under 0.5-1.1 MPa **pressure**, **vapor** temp. 180-250.degree., processing time 90-120 min. **Furfural** and **acetic acid** yields are 82 and 91% of the theor., resp.

ST **furfural** manuf **pentosan** vegetable raw material;  
**acetic acid** manuf **pentosan** raw material;  
 carboxylic acid hydrolysis catalyst **furfural** prodn; sulfuric acid hydrolysis catalyst **furfural** prodn

IT Hydrolysis catalysts  
 (acid; process and catalytic soln. for producing of **furfural** and **acetic acid**)

IT Wood

(after tannin extn., comminuted; process and catalytic soln. for producing of furfural and acetic acid)

IT Dehydration catalysts  
 (process and catalytic soln. for producing of furfural and acetic acid)

IT Carboxylic acids, uses  
 RL: CAT (Catalyst use); USES (Uses)  
 (process and catalytic soln. for producing of furfural and acetic acid)

IT Pentosans  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (process and catalytic soln. for producing of furfural and acetic acid)

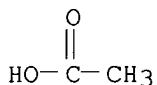
IT 64-18-6, Formic acid, uses 7664-93-9, Sulfuric acid, uses 7733-02-0,  
 Zinc sulfate 10043-01-3, Aluminum sulfate  
 RL: CAT (Catalyst use); USES (Uses)  
 (process and catalytic soln. for producing of furfural and acetic acid).

IT 64-19-7P, Acetic acid, preparation  
 98-01-1P, Furfural, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (process and catalytic soln. for producing of furfural and acetic acid)

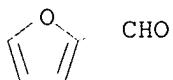
IT 64-19-7P, Acetic acid, preparation  
 98-01-1P, Furfural, preparation  
 RL: IMF (Industrial manufacture); PREP (Preparation)  
 (process and catalytic soln. for producing of furfural and acetic acid)

RN 64-19-7 HCPLUS

CN Acetic acid (7CI, 8CI, 9CI) (CA INDEX NAME)

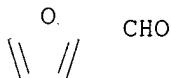


RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 10 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1995:582476 HCPLUS  
 DN 122:317229  
 TI Hydrolysis of pentosan-rich plant materials  
 IN Maciejewski, Zdzislaw; Lachman, Ignacy; Bronikowski, Krzysztof; Gil,  
 Tadeusz; Brunka, Jerzy; Witek, Jan; Grzonka, Jan  
 PA Zaklady Plyt Pilsniowych, Pol.; Instytut Ciezkich Syntezy Organicznej  
 "BLACHOWNIA"; Biuro Projektow i Realizacji Inwestycji Przemyslu Syntezy  
 Chemicznej "PROSYNCHEM"  
 SO Pol., 6 pp.  
 CODEN: POXXA7  
 DT Patent  
 LA Polish  
 IC ICM C07D307-50  
 CC 43-9 (Cellulose, Lignin, Paper, and Other Wood Products)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	PL 159178	B1	19921130	PL 1987-265654	19870511
PRAI	PL 1987-265654		19870511		
AB	<b>Furfural</b> is extd. from crumbled pentosan-rich plant materials by impregnating the materials to 30-50% with water contg. .1toreq.4% HOAc or weak org. acid in a feeder equipped with a helical feeding screw, exposing the impregnated materials to <b>steam</b> under <b>pressure</b> in a hydrolyzer, passing the hydrolyzed materials through a 2nd feeder where the plant material is impregnated to 50-70% with strong acid or strong acid salts, and exposing the materials a 2nd time to <b>steam</b> under <b>pressure</b> in the hydrolyzer.				
ST	<b>furfural</b> extn wood hydrolysis				
IT	Hydrolysis Wood (hydrolysis of pentosan-rich plant materials for extn. of <b>furfural</b> )				
IT	98-01-1P, <b>Furfural</b> , preparation RL: PUR (Purification or recovery); PREP (Preparation) (hydrolysis of pentosan-rich plant materials for extn. of <b>furfural</b> )				
IT	98-01-1P, <b>Furfural</b> , preparation RL: PUR (Purification or recovery); PREP (Preparation) (hydrolysis of pentosan-rich plant materials for extn. of <b>furfural</b> )				
RN	98-01-1 HCPLUS				
CN	2-Furancarboxaldehyde (9CI) (CA INDEX NAME)				

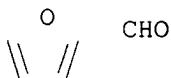


L51 ANSWER 11 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1990:589821 HCPLUS  
 DN 113:189821  
 TI Method of producing **furfural** and yeast nutrients  
 IN Shishakov, E.; Shkut, V. M.; Ruchai, N. S.; Dernovich, A. V.; Usmanova, G.  
 Sh.; Talapin, V. I.; Aptsevsko, M. I.  
 PA Belorussian Technological Institute, USSR  
 SO U.S.S.R.  
 From: Otkrytiya, Izobret. 1989, (34), 123.  
 CODEN: URXXAF  
 DT Patent  
 LA Russian  
 IC ICM C12N001-22  
 ICS C07D307-50  
 CC 16-9 (Fermentation and Bioindustrial Chemistry)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	SU 1507789	A1	19890915	SU 1987-4383909	19871230
PRAI	SU 1987-4383909		19871230		
AB	<b>Furfural</b> and yeast nutrients are obtained by <b>vapor</b> -phase treatment of pentosan-contg. raw material in the presence of a catalyst with simultaneous distn. of <b>furfural</b> , hydrolysis of the lignocellulose residue with H <sub>2</sub> SO <sub>4</sub> , sepn. of the ppt., and subsequent use of the supernatant liq. as a nutrient medium for yeast. The yield of the target products is increased by using nitroammophos or ammophos as the catalyst at 3-10% soln. in H <sub>2</sub> SO <sub>4</sub> 3-10% soln. at a 0.2-0.3 hydromodulus at 160-185.degree. for 60-100 min and 0.6-1.1 mPa; and by				

treating the lignocellulose residue, prior to hydrolysis, with H<sub>2</sub>O or with lyuter [sic], following distn. of furfural, at a 1-4 hydromodulus at 170-185.degree. and 0.8-1.1 MPa pressure for 10-30 min.

ST furfural isolation pentosan; yeast nutrient prepn  
pentosan  
IT Nutrients  
(for yeast, prepn. of furfural and, from pentosans)  
IT Pentosans  
RL: PREP (Preparation)  
(furfural and yeast nutrient prepn. from)  
IT Yeast  
(nutrients, prepn. of furfural and, from pentosans)  
IT 98-01-1P, 2-Furancarboxaldehyde, preparation  
RL: PREP (Preparation)  
(prepns. of yeast nutrients and, from pentosans)  
IT 98-01-1P, 2-Furancarboxaldehyde, preparation  
RL: PREP (Preparation)  
(prepns. of yeast nutrients and, from pentosans)  
RN 98-01-1 HCPLUS  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 12 OF 30 HCPLUS COPYRIGHT 2003 ACS  
AN 1989:556440 HCPLUS  
DN 111:156440  
TI Process and apparatus for the manufacture of furfural  
IN Zeitsch, Karl Joachim  
PA Krupp, Fried., G.m.b.H., Fed. Rep. Ger.  
SO Ger. Offen., 9 pp.  
CODEN: GWXXBX  
DT Patent  
LA German  
IC ICM C07D307-50  
ICS C13G001-00  
CC 45-4 (Industrial Organic Chemicals, Leather, Fats, and Waxes)  
Section cross-reference(s): 27, 47  
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 3842825	A1	19890720	DE 1988-3842825	19881220
	DE 3842825	C2	19910124		
	FI 8806014	A	19890709	FI 1988-6014	19881228
	ZA 8900080	A	19891025	ZA 1989-80	19890105
	CH 678183	A	19910815	CH 1989-34	19890105
	US 4912237	A	19900327	US 1989-295314	19890109

PRAI DE 1988-3800317 19880108  
DE 1988-3842825 19881220

AB Furfural is prepnd. in high yield by the H<sub>2</sub>SO<sub>4</sub> hydrolysis and dehydration of pentosan-contg. materials (e.g., bagasse, straw, wood waste, etc.) in an app. in which the comminuted raw material in suspension with dil. H<sub>2</sub>SO<sub>4</sub> is continuously fed into a flow-through reactor (170-230.degree.), the temp. raised by mixing the feed suspension with high-pressure steam, the exiting suspension fed into an expansion evaporator (operated at .ltoreq.760 torr), and the furfural-H<sub>2</sub>O-steam mixt. is directly condensed in a conventional condensation app. The app. produces

acid-free residues and does not require the long residence times of prior-art **furfural** manufg. app. A process schematic is presented.

ST **furfural** manuf **pentosan** hydrolysis dehydration;  
 sulfuric acid hydrolysis **pentosan** material; bagasse hydrolysis  
 dehydration **furfural** manuf; straw hydrolysis dehydration  
**furfural** manuf; wood hydrolysis dehydration **furfural**  
 manuf

IT **Pentosans**  
 RL: USES (Uses)  
 (hydrolysis and dehydration of, **furfural** manuf. by, app. for)

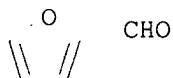
IT 7664-93-9P, Sulfuric acid, **reactions**  
 RL: RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (hydrolysis and dehydration by, of **pentosans** in  
**furfural** manuf., app. for)

IT 98-01-1P, **Furfural**, preparation  
 RL: PREP (Preparation)  
 (manuf. of, by hydrolysis and dehydration of **pentosan**-contg.  
 materials, app. for)

IT 98-01-1P, **Furfural**, preparation  
 RL: PREP (Preparation)  
 (manuf. of, by hydrolysis and dehydration of **pentosan**-contg.  
 materials, app. for)

RN 98-01-1 HCAPLUS

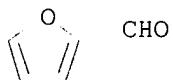
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 13 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1988:71732 HCAPLUS  
 DN 108:71732  
 TI Production of **furfural** and culture medium for fodder yeasts from  
**pentosan**-containing biological materials  
 IN Morozov, E. F.; Shishakov, E. P.; Shkut, V. M.; Ruchai, N. S.; Kebich, M.  
 S.; Kolomeets, V. I.; Samsonov, P. I.  
 PA Belorussian Technological Institute, USSR  
 SO U.S.S.R.  
 From: Otkrytiya, Izobret. 1987, (30), 112.  
 CODEN: URXXAF  
 DT Patent  
 LA Russian  
 IC ICM C12N001-22  
 ICI C12N001-22, C12R001-72  
 CC 9-11 (Biochemical Methods)  
 Section cross-reference(s): 27  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	SU 1330155	A1	19870815	SU 1984-3813601	19841115
PRAI	SU 1984-3813601		19841115		
AB	Vapor-phase treatment of <b>pentosan</b> -contg. raw material with heating and at elevated pressure in the presence of a catalyst results in distn. of <b>furfural</b> . The cellobiose residue is hydrolyzed, the hydrolysate is neutralized, and a ppt. is sepd. with subsequent use of the supernatant liq. as a culture medium for the growth of feed yeasts. The yield of products is increased by using nitroammonium as the catalyst in a 1-6% concn. based on dry raw material, and treating the <b>pentosan</b> -contg. raw material for				

ST 60-100 min at 180-200.degree. and 1.0-1.6 MPa **pressure**.  
 ST **furfural** manuf **pentosan** nitroammophoska; cellolignin  
 hydrolyzate culture medium yeast  
 IT Culture media  
 (for yeast, manuf. of, from lignocellulose)  
 IT **Pentosans**  
 RL: ANST (Analytical study)  
 (**furfural** and yeast culture medium manuf. from biol.  
 materials contg.)  
 IT Yeast  
 (fodder, culture medium for, manuf. of, from lignocellulose)  
 IT Fertilizers  
 RL: CAT (Catalyst use); USES (Uses)  
 (nitrogen-phosphorus-potassium, as catalyst, in **furfural**  
 manuf. from **pentosan**-contg. biol. materials)  
 IT 7440-09-7P 7723-14-0P 7727-37-9P  
 RL: PREP (Preparation)  
 (fertilizers, nitrogen-phosphorus-potassium, as catalyst, in  
**furfural** manuf. from **pentosan**-contg. biol. materials)  
 IT 98-01-1P, **Furfural**, preparation  
 RL: PREP (Preparation)  
 (manuf. of, from **pentosan**-contg. biol. materials)  
 IT 11132-73-3D, Lignocellulose, hydrolyzates  
 RL: ANST (Analytical study)  
 (yeast culture medium manuf. from)  
 IT 98-01-1P, **Furfural**, preparation  
 RL: PREP (Preparation)  
 (manuf. of, from **pentosan**-contg. biol. materials)  
 RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 14 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1986:593248 HCPLUS  
 DN 105:193248  
 TI Continuous **pressureless** production of **2-furaldehyde**  
 IN Rendos, Frantisek; Zelnik, Andrej; Blazej, Anton; Pajtik, Jozef; Kosik,  
 Martin; Oltus, Eugen  
 PA Czech.  
 SO Czech., 4 pp.  
 CODEN: CZXXA9  
 DT Patent  
 LA Czech  
 IC C07D307-50  
 CC 43-9 (Cellulose, Lignin, Paper, and Other Wood Products)  
 Section cross-reference(s): 27, 44

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CS 218738	B	19830225	CS 1981-891	19810206
PRAI	CS 1981-891		19810206		
AB	Plant materials contg. <b>pentosans</b> , such as wood chips, straw, corn cobs, or bagasse were prehydrolyzed with 0.5-2.5% H <sub>2</sub> SO <sub>4</sub> 0.2-1% HCl, and the mixt. was boiled with 5-15% HCl to dehydrate <b>pentoses</b> to <b>2-furaldehyde</b> , which was sepd. by steam distn. and the HCl was recycled. Yields were 22-42%, based on dry wt. of starting hydrolyzate, depending on the material used.				

ST dehydration pentose furfuryl hydrochloric acid;  
 furaldehyde prodn pentosan plant material;  
 furfural prodn pentosan hydrolysis; corn cob hydrolysis  
 furnancarboxaldehyde; bagasse hydrolysis furancarboxaldehyde; wood  
 hydrolysis furancarboxyaldehyde

IT Pentoses  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (dehydration of, to furaldehyde, continuous)

IT Bagasse  
 (furaldehyde prodn. from, continuous, by pressureless  
 hydrolysis)

IT Corncob

IT Straw  
 (furaldehyde prodn. from, continuous, by pressureless  
 hydrolysis method)

IT Dehydration catalysts  
 (hydrochloric acid, for pentoses to furaldehyde)

IT Dehydration, chemical  
 (of pentoses to furaldehyde)

IT Hydrolysis  
 (pre-, of pentosan-contg. plant materials, in continuous  
 furaldehyde prodn.)

IT Pentosans  
 RL: USES (Uses)  
 (prehydrolysis of, in furaldehyde prodn., continuous and  
 pressureless)

IT Wood  
 (chips, furaldehyde prodn. from, continuous, by  
 pressureless hydrolysis method)

IT 7647-01-0, uses and miscellaneous  
 RL: CAT (Catalyst use); USES (Uses)  
 (dehydration catalysts, for pentoses in furaldehyde  
 prodn.)

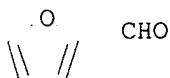
IT 7664-93-9, reactions  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (prehydrolysis of pentosan-contg. plant material by, in  
 continuous furaldehyde prodn.)

IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (prodn. of, from pentosan-contg. plant material, continuous)

IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (prodn. of, from pentosan-contg. plant material, continuous)

RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 15 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1985:80642 HCPLUS  
 DN 102:80642  
 TI Apparatus and method for producing furfural from spent acid  
 liquors in the production of cellulose  
 IN Huber, Johann  
 PA Chemiefaser Lenzing A.-G., Austria  
 SO Eur. Pat. Appl., 12 pp.  
 CODEN: EPXXDW  
 DT Patent

LA German  
 IC C07D307-50; D21C011-00  
 CC 43-6 (Cellulose, Lignin, Paper, and Other Wood Products)  
 Section cross-reference(s): 27

## FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
--	------------	------	------	-----------------	------

PI	EP 124507	A1	19841107	EP 1984-890075	19840426
	EP 124507	B1	19890628		
	R: DE, FR, IT, SE				
	AT 8301589	A	19840515	AT 1983-1589	19830502
	AT 376717	B	19841227		

PRAI AT 1983-1589 19830502

AB Furfural [98-01-1] is prep'd. by stepwise heating of spent sulfite liquor in vapor condensers to dehydrate pentoses and pentosans, expansion at lower temp., and distg. furfural from the condensate. Thus, 140 m<sup>3</sup> spent liquor from the Mg(HSO<sub>3</sub>)<sub>2</sub> process, contg. .apprx.30 g xylose/L, was heated to 210.degree. under pressure and expanded at 195.degree. to give .apprx.25 m<sup>2</sup> condensate contg. 2000 kg furfural (.apprx.74.5% yield based on xylose).

ST furfural sulfite liquor spent; dehydration xylose sulfite liquor

IT Dehydration, chemical

(thermal, of pentoses to furfural, in spent sulfite liquors)

IT Sulfite liquors and Cooking liquors, uses and miscellaneous

RL: USES (Uses)

(spent, furfural prodn. from)

IT 98-01-1P, preparation

RL: PREP (Preparation)

(manuf. of, from spent sulfite liquor)

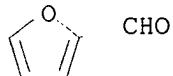
IT 98-01-1P, preparation

RL: PREP (Preparation)

(manuf. of, from spent sulfite liquor)

RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 16 OF 30 HCPLUS COPYRIGHT 2003 ACS

AN 1984:409015 HCPLUS

DN 101:9015

TI 2-Furaldehyde

IN Zelnik, Andrej; Rendos, Frantisek; Blazej, Anton; Pajtik, Jozef; Kosik, Martin

PA Czech.

SO Czech., 3 pp.

CODEN: CZXXA9

DT Patent

LA Slovak

IC C07D307-50

CC 43-9 (Cellulose, Lignin, Paper, and Other Wood Products)  
 Section cross-reference(s): 27

## FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CS 210733	B	19820129	CS 1980-4713	19800702
PRAI	CS 1980-4713		19800702		

AB A continuous process for manuf. of **2-furfuraldehyde**  
(I) [98-01-1] at atm. **pressure** comprises hydrolysis  
of (**oligo**)**pentoses**, present in sulfite liquors and  
**pentose-contg.** wastes from manuf. of D-xylose from cellulosic  
materials (e.g., wood waste, such as chips, corn cobs, straw, etc.) with  
1% H<sub>2</sub>SO<sub>4</sub> in a fluidized bed at 220.degree. followed by dehydration of the  
hydrolyzate. The fluidized state of the inorg. carrier (SiO<sub>2</sub>) is induced  
by mech. vibrations with simultaneous **heating** and the liquor to  
be hydrolyzed is sprayed on the surface of the carrier particles. The I  
**vapors** together with water **vapor** are condensed and I is  
isolated by rectification.

ST furfural manuf pentosan soln; fluidized bed  
furfural manuf

IT **Pentoses**  
RL: RCT (Reactant); RACT (Reactant or reagent)  
(from cellulosic materials, hydrolysis of, in fluidized bed at atm.  
**pressure**, furfural manuf. by)

IT Fluidized beds and systems  
(furfural manuf. in, at atm. **pressure**, from (**oligo**)  
**pentose-contg.** liqs.)

IT **Oligosaccharides**  
RL: USES (Uses)  
(**pentosans**, from cellulosic materials, hydrolysis of, in  
fluidized beds at atm. **pressure**, furfural manuf.  
by)

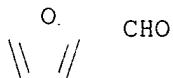
IT Hydrolysis  
(acid, of (**oligo**)**pentose-contg.** liqs., in fluidized bed at  
atm. **pressure**, in furfural manuf.)

IT 98-01-1P, preparation  
RL: PREP (Preparation)  
(manuf. of, in fluidized bed, at atm. **pressure**, from (**oligo**)  
**pentose-contg.** liqs.)

IT 98-01-1P, preparation  
RL: PREP (Preparation)  
(manuf. of, in fluidized bed, at atm. **pressure**, from (**oligo**)  
**pentose-contg.** liqs.)

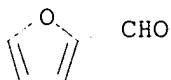
RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



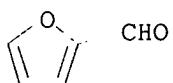
L51 ANSWER 17 OF 30 HCPLUS COPYRIGHT 2003 ACS  
AN 1980:41741 HCPLUS  
DN 92:41741  
TI **Furfural**  
IN Maciejewski, Zdzislaw; Wojciechowski, Jerzy; Rutkowska, Elzbieta; Torbicz,  
Kazimierz; Wilczynski, Jerzy; Lachman, Ignacy; Spaczynska, Grazyna;  
Landek, Rudolf  
PA Instytut Ciezkiej Syntezy Organicznej "Blachownia", USSR  
SO U.S.S.R.  
From: Otkrytiya, Izobret., Prom. Obraztsy, Tovarnye Znaki 1979, (31), 232.  
CODEN: URXXAF  
DT Patent  
LA Russian  
IC C07D307-50  
CC 27-6 (Heterocyclic Compounds (One Hetero Atom))  
FAN.CNT 1  
PATENT NO. KIND DATE APPLICATION NO. DATE

PI SU 682130 D 19790825 SU 1975-2145956 19750623  
 PRAI SU 1975-2145956 19750623  
 AB Furfural was prep'd. by thermal hydrolysis of pentosan-contg. plant raw materials in the presence of H<sub>2</sub>SO<sub>4</sub> at high pressure followed by distn. of the furfural condensate. The heat from the burning of the waste products was used for the thermal hydrolysis. The process was improved by heating lignocellulose at 200-300.degree. with superheated steam and combining the furfural condensate with the condensate from the thermal hydrolysis stage.  
 ST furfural; thermal hydrolysis pentosan  
 IT Hydrolysis  
     (of pentosan, furfural from)  
 IT Pentosans  
     RL: RCT (Reactant); RACT (Reactant or reagent)  
         (thermal hydrolysis of)  
 IT 98-01-1P, preparation  
     RL: PREP (Preparation)  
         (by thermal hydrolysis of pentosan)  
 IT 98-01-1P, preparation  
     RL: PREP (Preparation)  
         (by thermal hydrolysis of pentosan)  
 RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



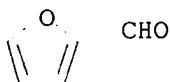
L51 ANSWER 18 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1978:4714 HCPLUS  
 DN 88:4714  
 TI Processing of nonedible plant wastes to obtain furfural and yeasts  
 AU Golowin, W. W.  
 CS Pol.  
 SO Przemysl Spozywczy (1977), 31(7), 262-4  
     CODEN: PRSPAD; ISSN: 0033-250X  
 DT Journal  
 LA Polish  
 CC 16-4 (Fermentations)  
 AB The technol. of furfural [98-01-1] and yeast prodn. from hydrolyzates of wastes from the food and wood-processing industries is detailed. For furfural manuf. the pentosan-contg. raw material is treated with H<sub>2</sub>SO<sub>4</sub> and steam-hydrolyzed, the furfural-contg. vapors are condensed and sep'd. from noncondensing gases, and the furfural is isolated from the condensate, purified, and stabilized. After the furfural hydrolysis, the pressure is decreased from 3 to 1.2 atm, a 0.5% H<sub>2</sub>SO<sub>4</sub> soln. is added, and a hexose-contg. hydrolyzate is transferred for neutralization and yeast culturing.  
 ST plant waste furfural yeast  
 IT Yeast  
     (culture medium for, from plant waste)  
 IT Waste solids  
     (furfural and yeast prodn. from, of plants)  
 IT Plant  
     (wastes, furfural and yeast prodn. from)  
 IT Wood

(wastes, furfural and yeast prodn. from)  
IT 98-01-1P, preparation  
RL: PREP (Preparation)  
(prodn. of, from plant wastes)  
IT 98-01-1P, preparation  
RL: PREP (Preparation)  
(prodn. of, from plant wastes)  
RN 98-01-1 HCAPLUS  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 19 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
AN 1977:53905 HCAPLUS  
DN 86:53905  
TI Improvement of the hydrolysis process  
AU Nevzorova, L. S.  
CS Kanskii Biokhim. Zavod, Kansk, USSR  
SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1976), (8), 19-20  
CODEN: GLKPA2; ISSN: 0016-9706  
DT Journal  
LA Russian  
CC 16-13 (Fermentations)  
AB After installation of a new hydrolysis app. for high-speed digestion, a hydrolyzate with an av. concn. of 3.67% reducing substances was obtained using a raw material consisting of 57% chips, 26.9% sawdust, and 16.1% other materials. The lignin residue contained 15.7% scarcely hydrolyzable polysaccharides, 3.13% reducing substances, and 0.74% H<sub>2</sub>SO<sub>4</sub>. For the hydrolysis of the materials (8 m<sup>3</sup>), 30 L H<sub>2</sub>SO<sub>4</sub> distd. from furfural [98-01-1] prodn. was added at the rate of 40 m<sup>3</sup>/h. The pressure in the app. was gradually increased to 7-8 kg/m<sup>2</sup> for 20-25 min, decreased to 5 kg/cm<sup>2</sup> during 2 min, and again increased to 8 kg/cm<sup>2</sup>. The heating process lasted .apprx.30 min and percolation was reduced to 80 min. The pressure during percolation was 11.2-11.5 kg/cm<sup>2</sup>. The washing period was increased to remove more of the reducing substances. The hydrolyzable yield per app. was increased from 15 to 80 m<sup>3</sup> and the high rate of percolation increased the yield of reducing substances which permitted addnl. prodn. of feed yeast, alc., and furfural.  
ST hydrolysis fermn plant waste; wood hydrlysis app  
IT Wood  
(degrdn. of, for fermentor medium)  
IT Yeast  
(feed, wood digestion for cultivation of)  
IT Alcohols, preparation  
RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP (Preparation)  
(manuf. of, wood digestion for fermentative)  
IT Fermentation apparatus  
(wood digestion for medium for)  
IT 98-01-1P, preparation  
RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP (Preparation)  
(manuf. of, wood digestion for fermentative)  
IT 98-01-1P, preparation  
RL: BMF (Bioindustrial manufacture); BIOL (Biological study); PREP (Preparation)  
(manuf. of, wood digestion for fermentative)

RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 20 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1976:181811 HCPLUS  
 DN 84:181811  
 TI Degrading a polysaccharide-containing raw material by acid hydrolysis  
 IN Kiminki, Keijo; Kulmala, Raili; Sipila, Seppo  
 PA Osakeyhtio W. Rosenlew AB, Finland  
 SO Ger. Offen., 11 pp.  
 CODEN: GWXXBX  
 DT Patent  
 LA German  
 IC C13K; D21C; C07D; C07H  
 CC 43-2 (Cellulose, Lignin, Paper, and Other Wood Products)

FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	DE 2541119	A1	19760408	DE 1975-2541119	19750915
	FI 7402911	A	19760405	FI 1974-2911	19741004
	FI 51371	B	19760831		
	HU 170628	P	19770728	HU 1975-R0851	19750827
	CS 191945	P	19790731	CS 1975-6167	19750910
	NO 7503114	A	19760406	NO 1975-3114	19750912
	NO 141902	B	19800218		
	NO 141902	C	19800528		
	SE 7510297	A	19760405	SE 1975-10297	19750916
	SE 425508	B	19821004		
	SE 425508	C	19830113		
	CA 1051884	A1	19790403	CA 1975-235735	19750916
	DD 124873	C	19770316	DD 1975-188395	19750917
	US 4029515	A	19770614	US 1975-615037	19750919
	FR 2286853	A1	19760430	FR 1975-28922	19750922
	FR 2286853	B1	19790831		
	PL 97700	P	19780330	PL 1975-183667	19750930

PRAI FI 1974-2911 19741004

AB Two-stage continuous degrdn. of hogged birch chips or bagasse with aq. H<sub>2</sub>SO<sub>4</sub> [7664-93-9] at high temp. and pressure gave furfural (I) [98-01-1], org. acids, and monosaccharides. Thus, moistening birch chips (cellulose (II) content 72% and humidity 15%) with 10% H<sub>2</sub>SO<sub>4</sub> in the upper part of the reactor, and heating the acidified chips and the liq. phase formed from acid-decompd. chips in the lower part of the reactor with steam at 185.degree. and 11 atm for 30 min degraded 91.1% of II and gave 16.9% I, 12.2% org. acids, and 20.5% monosaccharide based on II content in wood.

ST wood degrdn sulfuric acid; furfural manuf wood degrdn; org acid wood degrdn; monosaccharide manuf wood degrdn

IT Carboxylic acids, preparation

RL: PREP (Preparation)

(by degrdn. of bagasse and birch wood chips with sulfuric acid)

IT Wood

(chips, degrdn. of birch, with sulfuric acid)

IT Bagasse

(degrdn. of, with sulfuric acid)

IT **Saccharides**  
 RL: USES (Uses)  
 (mono-, by degrdn. of bagasse and birch wood chips with sulfuric acid)

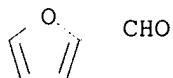
IT **98-01-1P, preparation**  
 RL: PREP (Preparation)  
 (by degrdn. of bagasse and birch wood chips with sulfuric acid)

IT **7664-93-9, reactions**  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (degrdn. with, of bagasse and birch wood chips)

IT **98-01-1P, preparation**  
 RL: PREP (Preparation)  
 (by degrdn. of bagasse and birch wood chips with sulfuric acid)

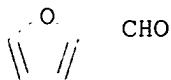
RN 98-01-1 HCPLUS

CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



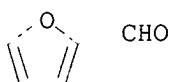
L51 ANSWER 21 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1976:107410 HCPLUS  
 DN 84:107410  
 TI Control of hydrolyzers for producing **furfural** from sugar cane bagasse  
 IN Reis, Thomas  
 PA Fr.  
 SO Fr. Demande, 5 pp.  
 CODEN: FRXXBL  
 DT Patent  
 LA French  
 IC C07D  
 CC 44-2 (Industrial Carbohydrates)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	FR 2261264	A1	19750912	FR 1974-5431	19740218
	FR 2261264	B3	19761203		
PRAI	FR 1974-5431		19740218		
AB	A method is described for controlling the hydrolysis of sugar cane bagasse or all products contg. hydrolyzable <b>pentosans</b> , by adjusting the pressure on the <b>furfural</b> [98-01-1] vapor line to the last of a battery of hydrolyzers, using automatically controlled flow-meters on both supply and <b>furfural</b> lines.				
ST	sugar cane bagasse <b>furfural</b> ; hydrolysis sugar cane bagasse				
IT	Bagasse ( <b>furfural</b> prodn. from, control of hydrolyzers in)				
IT	Hydrolysis (of bagasse, in <b>furfural</b> prodn.)				
IT	<b>98-01-1P, preparation</b> RL: PREP (Preparation) (from sugar cane bagasse, control of hydrolyzers for)				
IT	<b>98-01-1P, preparation</b> RL: PREP (Preparation) (from sugar cane bagasse, control of hydrolyzers for)				



L51 ANSWER 22 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1974:82621 HCAPLUS  
 DN 80:82621  
 TI **Furfural**  
 IN Morozov, E. F.  
 PA Kirov, S. M., Belorussian Technological Institute  
 SO U.S.S.R.  
 From: Otkrytiya, Izobret., Prom. Obraztsy, Tovarnye Znaki 1973, 50(45), 95.  
 CODEN: URXXAF  
 DT Patent  
 LA Russian  
 IC C07D  
 CC 27-6 (Heterocyclic Compounds (One Hetero Atom))  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	SU 405881	T	19731105	SU 1970-1404291	19700209
PRAI	SU 1970-1404291		19700209		
AB	Furfural was obtained from a pentosan-contg. raw material by moistening it with a soln. of acid catalyst, drying it with a gaseous cooling agent and treating with superheated steam at atm. pressure. The process was improved by repetition of the treatment.				
ST	furfural manuf; pentosan hydrolysis				
IT	Pentosans RL: RCT (Reactant); RACT (Reactant or reagent) (manuf. of furfural from)				
IT	98-01-1P, preparation RL: PREP (Preparation) (from pentosans)				
IT	98-01-1P, preparation RL: PREP (Preparation) (from pentosans)				
RN	98-01-1 HCAPLUS				
CN	2-Furancarboxaldehyde (9CI) (CA INDEX NAME)				



L51 ANSWER 23 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1974:38552 HCAPLUS  
 DN 80:38552  
 TI Industrial testing of the direct preparation of furfural with the preliminary removal of atmospheric oxygen from the raw material  
 AU Abramants, S. V.; Smol'yakov, V. P.; Epshtein, Ya. V.; Chudaev, V. V.; Kurzin, M. I.; Arshinov, A. N.; Ershov, B. N.; Kul'nevich, V. G.  
 CS USSR  
 SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1973), (5), 24-6  
 CODEN: GLKPA2; ISSN: 0016-9706  
 DT Journal  
 LA Russian

CC 43-8 (Cellulose, Lignin, Paper, and Other Wood Products)  
 Section cross-reference(s): 27

AB Oxygen converts **furfural** (I) [98-01-1] and hexoses to acids; its removal from the sunflower husks or corn stalks prior to their hydrolysis increases the yields of I and hexoses. The removal is achieved by evacuating the hydrolyzer to 0.4-0.5 kg/cm<sup>2</sup> residual air pressure and blowing steam through it. The final O concn. in the off-gases is 0.5%. The concns. of I in the hydrolyzates prep'd. with O removal from the sunflower husks and corn stalks are increased by 27 and 29%, resp., over the concns. of I obtained in the presence of O. Similarly, the concns. of hexoses are increased 23-4%.

ST oxygen removal **furfural** manuf; hydrolysis **polysaccharide**  
 oxygen **furfural**

IT Sunflower  
 (husks, air removal from, **furfural** and hexoses prep'n. in relation to)

IT Hexoses  
 RL: PREP (Preparation)  
 (prep'n. of, by hydrolysis of cellulosic materials, air removal effect on)

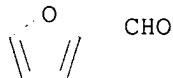
IT Air  
 (removal of, from cellulosic materials, **furfural** and hexoses prep'n. in relation to)

IT Corn  
 (stalks, air removal from, **furfural** and hexoses prep'n. in relation to)

IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (by hydrolysis of cellulosic materials, air removal effect on)

IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (by hydrolysis of cellulosic materials, air removal effect on)

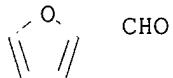
RN 98-01-1 HCAPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 24 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1973:126041 HCAPLUS  
 DN 78:126041  
 TI Principle of the catalytic activity of cations during **furfural** formation  
 AU Vedernikov, N. A.; Kalnins, A.  
 CS Inst. Khim. Drev., Riga, USSR  
 SO Khimiya Drevesiny (1968-74) (1972), 11, 111-14  
 CODEN: KHDRAN; ISSN: 0453-8226  
 DT Journal  
 LA Russian  
 CC 43-8 (Cellulose, Lignin, Paper, and Other Wood Products)  
 AB The rate const. (K) of **furfural** (I) [98-01-1] formation during heating wood in superheated steam at 137.deg. and 3.0 kg/cm<sup>2</sup> pressure is related to the ionization potentials (I) of the catalyst cation:  $K = a_0 + a_1I + a_2I^2 + a_3I^3$ , where  $a_0-a_3$  are consts. This relation is obeyed when NaCl, HCl, CaCl<sub>2</sub>, ZnCl<sub>2</sub>, AlCl<sub>3</sub>, or CrCl<sub>3</sub> solns. are used to impregnate wood before its degradation to I. The relation is not obeyed when FeCl<sub>3</sub> is the catalyst, because of the redox processes superimposed on the

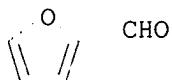
cation-catalyzed I formation. The catalyst anions do not participate in the catalysis. The catalysis may involve the formation of ionic intermediates between the hydrated catalyst cations and wood **pentosans**.

ST catalysis furfural formation wood  
 IT Wood  
     (heating of, with steam, furfural  
     formation in)  
 IT Catalysts and Catalysis  
     (methyl chloride, for formation of furfural, in steam  
     -heated wood)  
 IT Steam  
     (wood heating with, furfural formation by)  
 IT 7446-70-0, uses and miscellaneous 7646-85-7, uses and miscellaneous  
 7647-01-0, uses and miscellaneous 7647-14-5, uses and miscellaneous  
 10025-73-7 10043-52-4, uses and miscellaneous  
 RL: CAT (Catalyst use); USES (Uses)  
     (catalysts, for formation of furfural, in steam-  
     heated wood)  
 IT 98-01-1P, preparation  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
     (formation of, by heating of wood with steam)  
 IT 98-01-1P, preparation  
 RL: FORM (Formation, nonpreparative); PREP (Preparation)  
     (formation of, by heating of wood with steam)  
 RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

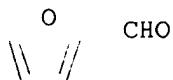


L51 ANSWER 25 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1970:467834 HCPLUS  
 DN 73:67834  
 TI Furfural from corncobs pretreated with low-frequency sound  
 AU Dolgopolov, I. P.; Goryaev, M. I.; Pugachev, M. G.  
 CS Inst. Khim. Nauk, Alma-Ata, USSR  
 SO Gidrolyzjnaya i Lesokhimicheskaya Promyshlennost (1970), 23(4), 16-17  
 CODEN: GLKPA2; ISSN: 0016-9706  
 DT Journal  
 LA Russian  
 CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)  
 AB Hydrolysis of corncob **pentosans** and dehydration of the  
     **pentoses** was carried out in a **preheated** autoclave, using  
     nontreated raw material and material pretreated with sound at a frequency  
     of 100 Hz. The raw material wetted with H<sub>2</sub>SO<sub>4</sub> of varying concns. and  
     contg. NaCl was pretreated for 90 min at room **temp**. The  
     **furfural vapor** was blown off at 4-10 kg/cm<sup>2</sup>. The  
     residual lignocellulose was hydrolyzed with 3% H<sub>2</sub>SO<sub>4</sub>. The highest yield  
     of **furfural** was obtained at a 6% acid concn. and blow-off  
     **pressure** 6 kg/cm<sup>2</sup>. The max. yield was 10.52% and 7.48% from the  
     pretreated and untreated corncobs. **Furfural** concn. in the  
     condensate was increased from 3.84 to 5.10%; the yield of sugars from  
     lignocellulose of pretreated corncobs was reduced (from 8-10% to 6-8%).  
 ST furfural corncobs; corncobs **furfural**; hydrolysis corncobs;  
 sound pretreatment corncobs hydrolysis  
 IT Sound, chemical and physical effects  
     (corncobs pretreated with, **furaldehyde** from, by hydrolysis)  
 IT Corncobs

IT (sound-pretreated, **furaldehyde** from, by hydrolysis)  
 IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (from sound-pretreated corncob, by hydrolysis)  
 IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (from sound-pretreated corncob, by hydrolysis)  
 RN 98-01-1 HCAPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 26 OF 30 HCAPLUS COPYRIGHT 2003 ACS  
 AN 1969:88986 HCAPLUS  
 DN 70:88986  
 TI Experimental apparatus for the continuous preparation of **furfural** from **pentosan** hydrolyzates. I  
 AU Smolyakov, V. P.; Kul'nevich, V. G.; Mukhin, B. P.  
 CS Krasnodar. Politekh. Inst., Krasnodar, USSR  
 SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1969), 22(1), 11-13  
 CODEN: GLKPA2; ISSN: 0016-9706  
 DT Journal  
 LA Russian  
 CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)  
 AB Earlier lab. expts. showed that multistage high-**temp.** dehydration of hydrolyzates can be carried out in continuously operating industrial equipment. See ibid. 1967. Exptl. equipment of industrial size has been constructed and subjected to a series of runs that confirmed the correctness of the high-**temp.** dehydration principles. The exptl. equipment differs from the lab. app. in the no. of dehydration stages. It is equipped with 6 serially connected **reactors**. The operating conditions can be varied so that 3, 4, 5, or all 6 **reactors** work. The **pentosan** hydrolyzate passes first through a **heat** exchanger where its **temp.** is raised to 50-100.degree., then goes to the **steam** ejector where the **steam** is introduced under a **pressure** of 30 atm. and at a **temp.** of 230-32.degree.. Dehydration, which begins in the ejector, continues in the consecutive **reactors** and in the pipes connecting them. The **steam/furfural** mixt. is continuously withdrawn into a condenser, and then into a receiving tank. Trial runs of the equipment were conducted with 3-6 **reactors** operating (schemes A, B, C, and D), the material dehydrated being **pentosan** hydrolyzates contg. 5-6% reducing substances, 0.5-0.6% hexoses, and 4.5-5% **pentoses**. Exptl. data obtained in these runs are given and the results obtained are discussed.  
 ST furfural prepn **pentosans**; **pentosans**  
 furfural prepn; hydrolysis **pentosans** furfural  
 IT **Pentosans**  
 RL: USES (Uses)  
 (furaldehyde from hydrolyzates of app. for)  
 IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (from **pentosan** hydrolyzates, app. for)  
 IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (from **pentosan** hydrolyzates, app. for)  
 RN 98-01-1 HCAPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 27 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1968:62511 HCPLUS  
 DN 68:62511  
 TI Process and apparatus for the physical and chemical transformation of agricultural and biological wastes  
 IN Pillorget, Pierre  
 PA Societe des Produits Chimiques de Sainte-Colombe  
 SO Fr., 6 pp.  
 CODEN: FRXXAK  
 DT Patent  
 LA French  
 IC C05F  
 CC 60 (Sewage and Wastes)  
 FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI FR 1484673		19670616	FR	19660301

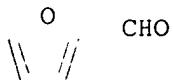
AB The wastes were hydrolyzed with acidulated water to transform the **pentosans** to **furfural** (I) and a part of the celluloses (II) into sugars. The extn. of I is limited to prevent the carbonization of II and of lignin, and the destruction of sugars. The crushed materials to be treated were sent by an elevator to a funnel where they were humidified until satn. after which they went into the hydrolyzer under 2 or 3 atm. of **vapor**; the dropping at the base of the app. permitted the recycling of excess acidulated water to the funnel. A system of sluices permitted, when the balance of **pressures** was obtained in the top of the app., to send I-contg. **vapors** through filters where the furan **gas** and then I-contg. **vapors** were condensed with a refrigerant, to be later on sent to a distn. unit. When the I content was .apprx.1%, hydrolysis was stopped, the hydrolyzate drawn off, the app. charged, and a new cycle begun. The neutralized hydrolyzate was stored and its sugars (nonsterilized) slowly transformed the matter into a moist compost contg. org. matter, N, sol. or insol. **phosphoric acid**, humic acids, and potash. This compost can be dried and sown with Azobacter.

ST COMPOSTS AGRICULTURAL WASTES; SUGARS AGRICULTURAL WASTES; BIOL WASTES TRANSFORMATION; AGRICULTURAL WASTES TRANSFORMATION

IT Wastes  
   (hydrolysis and composting of)  
 IT Compost  
   (manuf. of)  
 IT Hydrolysis  
   (of wastes)  
 IT 98-01-1P, preparation  
   RL: IMF (Industrial manufacture); PREP (Preparation)  
   (manuf. of, by hydrolysis of wastes)

IT 98-01-1P, preparation  
   RL: IMF (Industrial manufacture); PREP (Preparation)  
   (manuf. of, by hydrolysis of wastes)

RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 28 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1968:22886 HCPLUS  
 DN 68:22886  
 TI Recovery of furfural from pentosan-containing materials  
 IN Kaila, Anjal A.  
 PA Heinolan Faneritehdas Zachariassen ja Co.  
 SO Finn., 5 pp.  
 CODEN: FIXXAP  
 DT Patent  
 LA Finnish  
 IC C07D  
 CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)  
 FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	FI 36437		19670915	FI	19571231

AB A method and app. are described for recovery of furfural (I) during heat and pressure treatment of pentosancontg. materials for fiberboard and semicem. pulp manuf. Favorable conditions for I formation were achieved by application of inorg. or org. acids or their salts with steam on chips in an impregnation chamber, feeding the treated chips by a screw to a reaction vessel, and controlling the retention time and temp. to maintain the pH between 2.5 and 3.0 before releasing the material through another screw to a pressure refiner. A portion of the I was recovered from the vapors withdrawn from the lower section of the digestion to a distn. column and the rest from the vapors sepd. from the refined fiber mass in a cyclone and fed to the same distn. column.

ST FURFURAL RECOVERY PENTOSAN; FIBERBOARD  
 FURFURAL RECOVERY; SEMICHEM PULP FURFURAL RECOVERY;  
 PENTOSAN MATERIALS FURFURAL

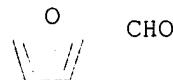
IT Paper pulp  
 (2-furaldehyde recovery in manuf. of semicem., app. for)

IT Fiberboard  
 (2-furaldehyde recovery in manuf. of, app. for)

IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (recovery of, in fiberboard and semicem. paper pulp manuf., app. for)

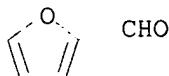
IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (recovery of, in fiberboard and semicem. paper pulp manuf., app. for)

RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 29 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1967:516764 HCPLUS  
 DN 67:116764

TI Continuous production of **furfural** during hightemperature  
**pentose** dehydration  
 AU Kul'nevich, V. G.; Smolyakov, V. P.; Maksimenko, N. S.; Fal'kovich, Yu. E.  
 SO Gidroliznaya i Lesokhimicheskaya Promyshlennost (1967), 20(4), 14-15  
 CODEN: GLKPA2; ISSN: 0016-9706  
 DT Journal  
 LA Russian  
 CC 27 (Heterocyclic Compounds (One Hetero Atom))  
 AB In the known processes for the continuous production of **furfural**, the **reaction** is carried out at .1toreq.200.degree., for .gtoreq.35 min., and the yield of **furfural** does not exceed 40-45% of the total content of **pentoses** in the hydrolyzate. The tacky resinous products formed from the degradation of **furfural** clog the equipment and conduits. The continuous process described in U.S.S.R. 179,331 (CA 65: 2473d), is based on the fact that at >200.degree. the rate of dehydration of **pentoses** increases more rapidly with **temp.** than the rate of **furfural** degradation. For best results, the hydrolyzate must be **heated** instantaneously to 230-50.degree., the hydrolyzate maintained at this **temp.** only for the time necessary for the dehydration of **pentoses**, and the **furfural** withdrawn from the **reaction** zone as soon as it is formed. NaCl is added to the hydrolyzate to convert resinous substances (the formation of a certain amt. of these substances cannot be avoided) into non-tacky product. Heating is achieved by injection of **steam**, and the **furfural** vapors are continuously withdrawn from the **reaction** zone. Several models of equipment were constructed, and one, shown to perform the best, is described. It comprises an injection vessel, two **reactors**, an **evaporator**, condenser, and condensate receivers. As detd. by a series of trial runs, the optimum conditions of the process are: content of sugars, H<sub>2</sub>SO<sub>4</sub>, and NaCl in the hydrolyzate 4.84, 0.5, and 1%, resp., a hydrolyzate feeding rate 0.17 l./min., **steam pressure** in the **boiler**, the 1st **reactor**, and the 2nd **reactor** 32-36, 28-20, and 10-15 atm., resp., **temp.** in the first **reactor** 230.degree., residence time in the first **reactor** 2.7-2.8 min. Under these conditions, 87-93% of the reducing substances are degraded, and the yield of **furfural** is 62-69.5%, based on total **pentoses**.  
 ST FURFURAL PENTOSE DEHYDRATION; PENTOSE  
 DEHYDRATION FURFURAL  
 IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (manuf. of, by **pentosan** hydrolyzate **steam** treatment under **pressure**)  
 IT 98-01-1P, preparation  
 RL: PREP (Preparation)  
 (manuf. of, by **pentosan** hydrolyzate **steam** treatment under **pressure**)  
 RN 98-01-1 HCPLUS  
 CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)



L51 ANSWER 30 OF 30 HCPLUS COPYRIGHT 2003 ACS  
 AN 1967:501196 HCPLUS  
 DN 67:101196  
 TI Formation of **furfural** from **pentosan**-containing raw materials under atmospheric **pressure** in the presence of sulfuric

acid  
AU Mel'nikov, N. P.; Zheltukhina, V. A.  
SO Sb. Tr., Gos. Nauch.-Issled. Inst. Gidroliz. Sul'fitno-Spirt. Prom.  
(1966), 15, 108-20  
DT Journal  
LA Russian  
CC 43 (Cellulose, Lignin, Paper, and Other Wood Products)  
AB Because of the necessity for recovering H<sub>2</sub>SO<sub>4</sub>, methods of production of furfural from plant materials involving the use of relatively large amts. of the acid (3-5:1 ratios) of high concns. (up to 50%), were found to be unsuitable for industrial applications. Methods involving higher pressures and temps. and 1-3% acid consumption based on the rawmaterial wt. were more economical and have been used in the industry. The process developed by the authors is based on the method described by Chetverikov and Lazarev (CA 28: 30719), which consists of impregnating the raw material with 3-4% acid, then treating with superheated steam (or hot gas) under atm. pressure, to conc. the soln. of the catalyst. A study of the kinetics of furfural formation from pure xylose solns. showed that the rate of the reaction increases considerably when the acid concn. reaches 20-5%. At .gtoreq. 40%, and accordingly higher b.p., 50% xylose is converted to furfural within 30-40 min. To attain such a concn., apprx. 0.5 kg. H<sub>2</sub>O must be evapd./kg. ovendry raw material, an operation difficult to carry out under com. conditions. The suggested process solves this problem by impregnating the raw material with a small amt. of more concd. acid. In lab. and pilot-plant expts., the concns. of H<sub>2</sub>SO<sub>4</sub> were 10-45%, the acid raw material ratios ranged from 0.3 to 0.05:1, and the steam temp. was 180-250.degree.. Sunflower husks and milled birchwood were the raw materials and the time of furfural distn. ranged from 120 to 180 min. In the lab., the max. furfural yield of 5.7-5.9% (on ovendry material) was obtained from sunflower husks at an acid concn. of 30% and a ratio of 0.27:1, and the max. yield of 6.85% from birchwood at 10% concn. and a 0.25:1 ratio. Under pilot-plant conditions, birchwood yielded a max. amt. of furfural (7.6%) at 40% and a 0.05:1 ratio.  
ST PENTOSAN MATERIALS FURFURAL PRODN; FURFURAL FROM PENTOSAN MATERIALS; XYLOSE FURFURAL FORMATION; SUNFLOWER HUSKS FURFURAL; BIRCHWOOD FURFURAL PRODN  
IT Wood (2-furaldehyde from birch, in presence of sulfuric acid)  
IT Sunflower (2-furaldehyde from husks, in presence of sulfuric acid)  
IT Kinetics, reaction (of formation of 2-furaldehyde from xylose in presence of sulfuric acid)  
IT Catalysts (sulfuric acid as, for prepn. of 2-furaldehyde from birchwood and sunflower husks or xylose)  
IT 7664-93-9, uses and miscellaneous RL: CAT (Catalyst use); USES (Uses) (catalysts, for prepn. of 2-furaldehyde from birchwood and sunflower husks or xylose)  
IT 98-01-1P, preparation RL: PREP (Preparation) (from sunflower husks and birchwood or xylose, in presence of sulfuric acid, kinetics of)  
IT 98-01-1P, preparation RL: PREP (Preparation) (from sunflower husks and birchwood or xylose, in presence of sulfuric acid, kinetics of)  
RN 98-01-1 HCPLUS  
CN 2-Furancarboxaldehyde (9CI) (CA INDEX NAME)

O  
\\/  
CHO

=> fil wpix  
FILE 'WPIX' ENTERED AT 17:19:05 ON 16 FEB 2003  
COPYRIGHT (C) 2003 THOMSON DERWENT

FILE LAST UPDATED: 14 FEB 2003 <20030214/UP>  
MOST RECENT DERWENT UPDATE: 200311 <200311/DW>  
DERWENT WORLD PATENTS INDEX SUBSCRIBER FILE, COVERS 1963 TO DATE

>>> DUE TO TECHNICAL ISSUES THE SDIS FOR UPDATES 200302-200304  
BASED ON ENTRY DATE (ED) MAY CONTAIN DOCUMENTS PREVIOUSLY  
DISTRIBUTED. IF YOU ENCOUNTER ANY SURPLUS DOCUMENTS OF THIS  
KIND, PLEASE CONTACT OUR HELPDESKS. UNJUSTIFIED CHARGES  
INCURRED WILL BE REVOKED OF COURSE.  
WE APOLOGIZE FOR ANY INCONVENIENCE CAUSED. <<<

>>> SLART (Simultaneous Left and Right Truncation) is now  
available in the /ABEX field. An additional search field  
/BIX is also provided which comprises both /BI and /ABEX <<<

>>> PATENT IMAGES AVAILABLE FOR PRINT AND DISPLAY <<<

>>> FOR DETAILS OF THE PATENTS COVERED IN CURRENT UPDATES,  
SEE <http://www.derwent.com/dwpi/updates/dwpicov/index.html> <<<

>>> FOR A COPY OF THE DERWENT WORLD PATENTS INDEX STN USER GUIDE,  
PLEASE VISIT:  
[http://www.stn-international.de/training\\_center/patents/stn\\_guide.pdf](http://www.stn-international.de/training_center/patents/stn_guide.pdf) <<<

>>> FOR INFORMATION ON ALL DERWENT WORLD PATENTS INDEX USER  
GUIDES, PLEASE VISIT:  
[http://www.derwent.com/userguides/dwpi\\_guide.html](http://www.derwent.com/userguides/dwpi_guide.html) <<<

=> d all abeq tech abex tot

L80 ANSWER 1 OF 18 WPIX (C) 2003 THOMSON DERWENT  
AN 2003-003444 [01] WPIX  
DNC C2003-001457  
TI Liquid phase conversion of cellulose for pharmaceuticals, comprises  
heating cellulose containing substances in presence of acid or  
base.  
DC D17 E19 F09  
PA (KAGAKU GIJUTSU SHINKO JIGYODAN  
CYC 1  
PI JP 2002205970 A 20020723 (200301)\* 4p C07C045-60  
ADT JP 2002205970 A JP 2001-66 20010104  
PRAI JP 2001-66 20010104  
IC ICM C07C045-60  
ICS C07C047-12; C07C047-127; C07D307-50; C07D493-04  
ICA C07B061-00  
AB JP2002205970 A UPAB: 20030101  
NOVELTY - Liquid phase contact conversion of cellulose comprises  
heating the cellulose containing substance in aprotic polar  
solvent in presence of acid or base, and transforming cellulose into

soluble substance.

USE - For converting the cellulose contained in natural fibers such as cotton to soluble substance such as levoglucosenone for pharmaceuticals as synthetic synthone, and **furfural** which is used as resin raw material.

ADVANTAGE - The cellulose is converted efficiently and selectively into useful chemical product by simple method.

Dwg.0/0

FS CPI

FA AB; DCN

MC CPI: D06-H; E06-A02E; E07-A01; E10-D01C; E10-F02B; F05-A02A

TECH UPTX: 20030101

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The cellulose containing substance is **heated** at a **temperature** of less than the **boiling point** of aprotic polar solvent in the presence of inorganic acid or base, and the cellulose is transformed into low molecular carbonyl compounds.

ABEX

SPECIFIC COMPOUNDS - The carbonyl compound is levoglucosenone and/or furfural if the conversion is in presence of acid, glyoxal and/or 2,3-butane dione if the conversion is in presence of base.

EXAMPLE - Sulfolane (2 ml) containing cellulose (20 mg) dispersed in nitrogen atmosphere was thermally decomposed at 200-280degreesC in presence of polyphosphoric acid and sulfuric acid. The cellulose was completely solubilized in a shorter duration and a brown solution was obtained. Levoglucosenone with a yield of 19.8 mol% was obtained when 1% polyphosphoric acid was used, and furfural with a yield of 17.5 mol% was obtained when 1% sulfuric acid was used.

L80 ANSWER 2 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 2002-292407 [33] WPIX

DNC C2002-085952

TI **Gaseous** acid catalysis method, particularly for production of **furfural**, involves treating a solid reactant containing hydroxyl group(s) with **superheated steam** and introducing an acid catalyst e.g. hydrochloric acid.

DC E13

IN ZEITSCH, K; ZEITSCH, K J

PA (ZEIT-I) ZEITSCH K; (BUZZ-I) BUZZARD J L; (STEI-I) STEINER P D

CYC 88

PI WO 2002022593 A1 20020321 (200233)\* EN 14p C07D307-50 <--  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ  
 NL OA PT SD SE SL SZ TR TZ UG ZW  
 W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE EE ES FI GB GD  
 GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV  
 MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT  
 UA UG US UZ VN YU ZA ZW

DE 10045465 A1 20020328 (200233) C07D307-50 <--  
 AU 2002024485 A 20020326 (200251) C07D307-50 <--

ADT WO 2002022593 A1 WO 2001-ZA146 20010914; DE 10045465 A1 DE 2000-10045465  
 20000914; AU 2002024485 A AU 2002-24485 20010914

FDT AU 2002024485 A Based on WO 200222593

PRAI DE 2000-10045465 20000914

IC ICM C07D307-50

AB WO 200222593 A UPAB: 20020524

NOVELTY - A method of **gaseous** acid catalysis comprises:

- (a) introducing a solid reactant containing hydroxyl group(s) into a **reactor**;
- (b) introducing **superheated steam** until the reactant is dry and the **temperature** is above the dew point of both water and the catalyst to be used;
- (c) introducing the acid together with the **superheated**

**steam** by means of a **vaporizer**; and  
 (d) condensing the formed **gas**.

USE - The method is particularly useful for forming **furfural** (claimed) from **pentosan** and/or pentose in the form of e.g. sunflower stems, corn cobs and/or bagasse.

ADVANTAGE - At any chosen **temperature**, the process can be carried out at atmospheric **pressure**. As the water/HCl catalyst is used at above its dew point, there is no corrosion and mild steel **reactors** can be used. The acid part of the catalyst can be completely recovered and reused. The residue is dry and free of acid so that it can be burnt, or partially burnt to give 'producer **gas**'. The yield of **furfural** is close to 100% compared with only 50% for present industrial processes.

Dwg.0/2

FS CPI

FA AB; DCN

MC CPI: E07-A01; E07-H; E10-D01C; E31-B03D; N04-D

TECH UPTX: 20020524

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Method: The reactant can form an ionized cluster complex with water and (part of) the acid. Reaction is carried out at atmospheric **pressure**. The acid is hydrochloric. Reaction is carried out at a **temperature** above the b. pt. of the maximum HCl-H<sub>2</sub>O azeotrope. The reactant is a sugar and the product is an aldehyde.

Preferred Reaction: **Furfural** is manufactured by hydrolysis of **pentosan** and/or pentose, and subsequent dehydration, in the presence of **gaseous** HCl. Reaction is performed at 115 deg. C and may be continuous. The HCl is recycled as its azeotrope with water. The yield of **furfural** is more than 90%.

ABEX

EXAMPLE - None given.

L80 ANSWER 3 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 2000-680440 [67] WPIX

DNC C2000-207127

TI Production of **furfural** from sulfite waste liquor involves heating by direct injection of steam, reaction by boiling under pressure, using easily separated ancillary, and complete vaporization by cooling and depressurization.

DC E13 F09

IN ZEITSCH, K; ZEITSCH, K J

PA (STEI-I) STEINER P D; (ZEIT-I) ZEITSCH K; (ITFU-N) INT FURAN TECHNOLOGY PTY LTD

CYC 93

PI DE 199117178 A1 20001019 (200067)\* 4p C07D307-48

WO 2000063488 A1 20001026 (200067) EN D21C011-00

RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
 OA PT SD SE SL SZ TZ UG ZW

W: AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM DZ  
 EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK  
 LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI  
 SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW

AU 2000054999 A 20001102 (200107) D21C011-00

EP 1171165 A1 20020116 (200207) EN D21C011-00

R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI

BR 2000009815 A 20020108 (200208) D21C011-00

NO 2001005031 A 20011211 (200211) D21C000-00

ZA 2001008552 A 20021127 (200305) 23p D21C000-00

ADT DE 199117178 A1 DE 1999-199117178 19990416; WO 2000063488 A1 WO 2000-ZA72  
 20000414; AU 2000054999 A AU 2000-54999 20000414; EP 1171165 A1 EP  
 2000-940001 20000414, WO 2000-ZA72 20000414; BR 2000009815 A BR 2000-9815  
 20000414, WO 2000-ZA72 20000414; NO 2001005031 A WO 2000-ZA72 20000414, NO

2001-5031 20011016; ZA 2001008552 A ZA 2001-8552 20011018  
 FDT AU 2000054999 A Based on WO 200063488; EP 1171665 A1 Based on WO  
 200063488; BR 2000009815 A Based on WO 200063488  
 PRAI DE 1999-19917178 19990416  
 IC ICM C07D307-48; D21C000-00; D21C011-00  
 ICS C07D307-50  
 AB DE 19917178 A UPAB: 20001223  
 NOVELTY - Production of **furfural** from sulfite waste liquor involves heating by injecting steam; passing it to a pressure reaction column, where the pressure is reduced slightly; keeping it boiling for a long time by easily separated ancillary; and then discharge and cooling, with total depressurization.  
 USE - None given.  
 ADVANTAGE - As sulfite waste liquor contains 0.9-5.6 % pentose, it is a potential raw material for **furfural** manufacture, especially at high pentose contents. Waste liquor from the calcium sulfite process is saturated with calcium sulfate, which soon builds up heavy deposits in heat exchangers and makes continuous operation impossible. On the other hand, the liquor cannot be kept at the boiling point for the reaction time by direct injection of steam. Heating by direct injection of steam and using an ancillary to maintain boiling overcomes this problem.  
 DESCRIPTION OF DRAWING(S) - The drawing shows the process scheme.

Pump 1  
 Circulation mixer 2  
 Valve 3  
 Thermally insulated reaction column 4  
 Cyclone for cooling and total depressurization, with steam generation  
 5  
 Heat exchanger for electrical heating of compressed air 6  
 Control cycle 7, 8  
 Condenser 9  
 Absorption column operating at atmospheric pressure 10  
 Circulating pump 11  
 Receiver for mixture of **furfural** and water liquefied in condenser 12  
 Dwg.1/1

FS CPI  
 FA AB; GI; DCN  
 MC CPI: E07-A01; E11-Q01; F05-A02C  
 TECH UPTX: 20001223

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Process: The liquor is heated to 180-280, preferably 240, degreesC by injecting steam. Partial depressurization in the reactor is carried out to 170-270, preferably 234, degreesC. The ancillary is heated compressed air, hot combustion gas, a single gas or preferably gas mixture at high temperature or hot liquid mercury. The temperature of the hot gas is 400-2000, preferably 600-1000 degreesC.

ABEX SPECIFIC MATERIALS - A specific example of the ancillary is hot liquid mercury.

L80 ANSWER 4 OF 18 WPIX (C) 2003 THOMSON DERWENT  
 AN 2000-544604 [50] WPIX  
 DNC C2000-162247  
 TI **Furfural** production by **heating** acidified raw material containing **pentosan** uses condensation of **steam** for **heating** and delayed flash **evaporator** by steady, small leakage stream to maintain **boiling**.  
 DC E13  
 IN ZEITSCH, K; ZEITSCH, K J  
 PA (STEI-I) STEINER P D; (ZEIT-I) ZEITSCH K; (ITFU-N) INT FURAN TECHNOLOGY PTY LTD  
 CYC 88

PI DE 19905655 A1 20000817 (200050)\* 5p C07D307-50 <--  
 WO 2000047569 A1 20000817 (200050) EN C07D307-50 <--  
 RW: AT BE CH CY DE DK EA ES FI FR GB GH GM GR IE IT KE LS LU MC MW NL  
 OA PT SD SE SL SZ TZ UG ZW  
 W: AE AL AM AT AU AZ BA BB BG BR BY CA CH CN CU CZ DE DK EE ES FI GB  
 GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU  
 LV MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR  
 TT UA UG US UZ VN YU ZA ZW  
 AU 2000033991 A 20000829 (200062) C07D307-50 <--  
 EP 1161426 A1 20011212 (200204) EN C07D307-50 <--  
 R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT  
 RO SE SI  
 BR 2000008143 A 20020312 (200226) C07D307-50 <--  
 ZA 2001006721 A 20021127 (200305) 19p C07D000-00  
 ADT DE 19905655 A1 DE 1999-19905655 19990211; WO 2000047569 A1  
 WO 2000-ZA24 20000211; AU 2000033991 A AU 2000-33991 20000211; EP  
 1161426 A1 EP 2000-912231 20000211, WO 2000-ZA24 20000211; BR  
 2000008143 A BR 2000-8143 20000211, WO 2000-ZA24 20000211; ZA  
 2001006721 A ZA 2001-6721 20010815  
 FDT AU 2000033991 A Based on WO 200047569; EP 1161426 A1 Based on WO  
 200047569; BR 2000008143 A Based on WO 200047569  
 PRAI DE 1999-19905655 19990211  
 IC ICM C07D000-00; C07D307-50  
 AB DE 19905655 A UPAB: 20001010  
 NOVELTY - Production of **furfural** comprises acidifying a raw  
 material containing **pentosan** with aqueous sulfuric acid,  
**heating** in a batch **reactor** by condensation of feed  
 stream of **steam** at a **temperature T1** and then delayed  
**flash evaporation** to keep the liquid phase **boiling**  
 continuously by maintaining a steady, small leakage stream, until a  
**temperature T2** is reached.  
 USE - None given.  
 ADVANTAGE - In existing industrial processes, which use plant  
 originally constructed for a cereal treatment operation or for making pulp  
 from wood, the yield does not exceed 60 %, largely as the result of  
 reaction of **furfural** with **xylose**. The present process is very  
 simple and gives about 100 % yield.  
 DESCRIPTION OF DRAWING(S) - The drawing shows the process scheme.  
 Reactor filled with acidified raw material 1  
 Valve admitting steam 2  
 Leakage valve 3  
 Valve opened to terminate reaction 4  
 Control equipment 5  
 Dwg.2/2  
 FS CPI  
 FA AB; GI; DCN  
 MC CPI: E07-A01  
 TECH UPTX: 20001010  
 TECHNOLOGY FOCUS - CHEMICAL ENGINEERING - Preferred Process: **Heat**  
**-up** and delayed flash **evaporation** are repeated once or more,  
 until **furfural** no longer forms. Delayed flash  
**evaporation** is carried out at 280-150, preferably 230-170  
 degreesC. The **reactor** has good thermal insulation and can have  
**heated** walls. All the required **valve** operations are  
 carried out automatically with a controller. The **temperature**  
 range of delayed flash **evaporation** and acid concentration of the  
 charge are coupled for optimum development of the process.  
 L80 ANSWER 5 OF 18 WPIX (C) 2003 THOMSON DERWENT  
 AN 1993-258728 [32] WPIX  
 CR 1992-299959 [36]  
 DNC C1993-114971  
 TI Pulping fibrous plant materials - to afford novel low mol. wt. lignin,

with recycle of solvents and filtrates etc..

DC A60 E13 F09

IN AGAR, R C; CRONLUND, M; GOPAL, G C; KATZEN, R; LEBLANC, R; LORA, J H; RASKIN, M N; WINNER, S R; WU, C F; LE, BLANC R; LE-BLANC, R

PA (REPA-N) REPAP TECHNOLOGIES INC

CYC 30

PI WO 9315261 A1 19930805 (199332)\* EN 62p D21C007-00  
 RW: AT BE CH DE DK ES FR GB GR IE IT LU MC NL PT SE  
 W: AU BR CA CZ FI HU JP KR NO NZ PL PT RU UA

AU 9336649 A 19930901 (199350) D21C007-00

NO 9402824 A 19940928 (199444) D21C007-00

FI 9403541 A 19940919 (199445) D21C000-00

JP 08500854 W 19960130 (199642) 51p D21C011-00

EP 746650 A1 19961211 (199703) EN D21C007-00  
 R: AT CH DE DK ES FR GB IT LI NL SE

BR 9305819 A 19970218 (199714) D21C007-00

AU 9712397 A 19970313 (199719) D21C009-02

AU 9712398 A 19970320 (199720) D21C003-20

AU 676829 B 19970327 (199721) D21C003-20

ADT WO 9315261 A1 WO 1993-US1256 19930129; AU 9336649 A AU 1993-36649 19930129; NO 9402824 A WO 1993-US1256 19930129, NO 1994-2824 19940729; FI 9403541 A WO 1993-US1256 19930129, FI 1994-3541 19940728; JP 08500854 W JP 1993-513540 19930129, WO 1993-US1256 19930129; EP 746650 A1 EP 1993-905902 19930129, WO 1993-US1256 19930129; BR 9305819 A BR 1993-5819 19930129, WO 1993-US1256 19930129; AU 9712397 A Div ex AU 1993-36649 19930129, AU 1997-12397 19970130; AU 9712398 A Div ex AU 1993-36649 19930129, AU 1997-12398 19970130; AU 676829 B AU 1993-36649 19930129

FDT AU 9336649 A Based on WO 9315261; JP 08500854 W Based on WO 9315261; EP 746650 A1 Based on WO 9315261; BR 9305819 A Based on WO 9315261; AU 676829 B Previous Publ. AU 9336649, Based on WO 9315261

PRAI WO 1992-US720 19920129

REP US 3585104; US 4100016; US 4401514; US 4470876; US 4511433; US 4584057; US 4764596; US 4971657

IC ICM D21C000-00; D21C003-20; D21C007-00; D21C009-02; D21C011-00  
 ICS D21C009-08; D21C009-10; D21C009-153

AB WO 9315261 A UPAB: 19931122  
 (A) Fibrous plant material (I) is pulped in an H<sub>2</sub>O-miscible organic solvent (II), and the solvent (II), lignin (III) and other by-prods. are recovered as follows: (a) the wetted (I) is heated; (b) the mixt. is impregnated with the solvent (II); (c) the impregnated (I) mixt. is extracted with (II) to afford a cooking mixt. which comprises black liq. (comprising (III) and the by-prods.) and cellulose pulp; and (d) (III) is recovered from the black liq.  
 (B) A low mol. wt. (III) of no. average mol. wt. less than 500 g/mol., and glass transition temp. 24-60 deg.C is new.  
 USE/ADVANTAGE - The process provides an energy efficient, environmentally attractive and economically feasible means of pulping fibrous plant materials, and recovering of the by-prods., with recycle of solvents and bleaching filtrates etc. **Furfural** is recovered, and this is used to recover the low mol. wt. lignin. The low mol. wt. lignin (B) may be used as an extender in phenolic wood adhesive systems, and also in applicns. requiring H<sub>2</sub>O-solubility (e.g. fibreglass binders), and as an intermediate for the prodn. of syringaldehyde etc. The process also affords a very pure lignin of no. average mol. wt. 700-1500 g/mol. as a fine uniform, free-flowing powder, which is suitable for use as a PhOH/HCHO extender in the prepn. of particle board and plywood, and in the prepn. of moulding cpds., urethane and epoxy resins, antioxidants, controlled release agents, and flow control agents.

Dwg.0/12

FS CPI

FA AB; DCN

MC CPI: A03-C02; A10-A; A11-C03; E07-A01; E11-Q01; F05-A02B;  
 F05-A02C

L80 ANSWER 6 OF 18 WPIX (C) 2003 THOMSON DERWENT  
 AN 1993-141601 [17] WPIX  
 DNC C1993-063648  
 TI Prodn. of **furfurol** for mfr of plastics - by hydrolysis of pentose-contg. material using hydrolysing mixt. contg. sulphuric acid, mercapto-benzimidazole, surfactant and water.  
 DC A41 E13  
 IN AIKHODZHAEV, B I; BERENSSTEIN, E I; YUSUPKHANOVA, M M  
 PA (COTT-R) COTTON CELLULOSE CHEM TECHN INST  
 CYC 1  
 PI SU 1731774 A1 19920507 (199317)\* 4p C07D307-50 <--  
 ADT SU 1731774 A1 SU 1990-4781275 19900110  
 PRAI SU 1990-4781275 19900110  
 IC ICM C07D307-50  
 AB SU 1731774 A UPAB: 19931116  
 The method comprises hydrolysis of a pentose-contg. material by treating it with a soln. of hydrolysing mixt. contg. sulphuric acid. The hydrolysing mixt. contains (in wt.%): sulphuric acid 2-10, mercapto benzimidazole 0.5-2.0, surfactant OP-7 0.25-1.0 and balance water. Mercaptobenzimidazole is contained in the hydrolysing soln. in the form of a suspension, and is uniformly distributed on the surface of starting vegetable material. The presence of mercapto-benzimidazole has delaying effect on decomposition rate of **furfurol**. OP-7 is used as an non-ionic surfactant.  
 After soaking of the pentose-contg. material, e.g. dried cotton or corn waste, in the hydrolysing soln., the pulp is transferred to hydrolysing appts. **heated** for 30 min. under **pressure 1** atmos. with removal of air and non-condensed **gases**. The **pressure** is raised to 6 atmos. and the **heating** is continued for 1.5 hrs. **Furfurol** is removed using **preheated steam**, and is collected in the form of condensate.  
 Tests show that the proposed method increases the yield of **furfurol** from cotton waste to 62% and from corn husks to 60%, i.e. by 21.4-27.3% compared to yield obtd. using the known method.  
 USE/ADVANTAGE - In the prodn. of **furfurol** by hydrolysis of a pentose-contg. vegetable material. The method increases yield of **furfurol** used in the prodn. of plastics. Bul.17/7.5.92  
 Dwg.0/0  
 FS CPI  
 FA AB; DCN  
 MC CPI: A01-E10; A01-E14; E07-A02D  
  
 L80 ANSWER 7 OF 18 WPIX (C) 2003 THOMSON DERWENT  
 AN 1991-250658 [34] WPIX  
 DNC C1991-109121  
 TI Extn. of biologically active material from raw vegetable material - by treatment with pentose hydrolysate, vacuum concn. of extract, **heat** treatment, and sepn. of clarified portion of concentrate.  
 DC B03 C02 D16 D17 E13  
 IN KLIMOVA, Z K; KRYMSKII, M V  
 PA (ALBU-R) ALBUMINE-SYNTH RES  
 CYC 1  
 PI SU 1595907 A 19900930 (199134)\*  
 ADT SU 1595907 A SU 1988-4460702 19880713  
 PRAI SU 1988-4460702 19880713  
 IC C13K001-04  
 AB SU 1595907 A UPAB: 19930928  
 Biologically active materials are extracted from raw vegetable materials more efficiently as follows. The starting material is treated with pentose hydrolysate used as an acid reagent, with solid to liquid ratio equal to 0.1-1.0. The extract is then concentrated under vacuum to 6-30 wt.% solids

content, heated to 50-100 deg.C and the clarified part of the concentrate is sepd.

USE/ADVANTAGE - In the microbiological industry for prepn. of extractive biologically active materials from raw vegetable materials used for prepn. of sugar solns. by hydrolysis. Used in prodn. of fodder yeasts, furfural, xylitol and other prods. Increased yield is obtd. Bul.36/30.9.90 @ (3pp Dwg.No.0/0)

FS CPI

FA AB; DCN

MC CPI: B04-A07F2; B04-B02B2; B07-A01; B10-A07; C04-A07F2; C04-B02B2; C07-A01; C10-A07; D05-H13; D06-H; E07-A01; E10-A07; E11-Q01

L80 ANSWER 8 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1991-205955 [28] WPIX

DNC C1991-089541

TI Furfural prodn. - by thermal treatment of pentosan -contg. vegetable material, impregnated with diluted sulphuric acid, using gaseous heat carrier.

DC A41 D17 E13

IN GOLUBROV, I M; RASKIN, M N; ZYSIN, L V

PA (GIDR-R) GIDROLIZPROM HYDROL

CYC 1

PI SU 1587051 A 19900823 (199128)\*

ADT SU 1587051 A SU 1988-4436070 19880329

PRAI SU 1988-4436070 19880329

IC C07D307-50

AB SU 1587051 A UPAB: 19930928

Furfural is produced by treatment of vegetable material contg. pentosan (e.g. wood shavings, sunflower stalks, etc.), previously impregnated with 1-6% H<sub>2</sub>SO<sub>4</sub> soln. in counter-current of hot gaseous heat carrier (e.g. steam, at 300-400 deg.C and 0.02-0.1 MPa, or optional inert gaseous heat carrier), with simultaneous diminution of material to particle size 20-70 microns.

The yield of furfural is increased to 90% of theoretical yield against 26-42% by the known method. The consumption of gaseous heat carrier is 1-8 kg/kg of absolutely dry starting material. The time of residence of furfural in reactor is reduced to 0.05-0.1 sec. and the size of equipment is reduced owing to intensified heat-mass transfer and chemical processes. Cellulose-lignin flour, obtd. as by prod., can be utilised by further hydrolysis, to produce sugars or used as filler for high Mwt. cpds. etc.

USE/ADVANTAGE - Produced furfural is widely used in prodn. of plastics. Increased yield of furfural is obtd. using intensified technology. Bul.31/23.8.90 @ (4pp Dwg.No.0/0)

FS CPI

FA AB; DCN

MC CPI: A01-E10; D06-C; E07-A01

L80 ANSWER 9 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1991-085410 [12] WPIX

DNC C1991-036443

TI Prodn. of furfural from vegetable material - by two-stage treatment with sulphuric acid soln. and treatment with steam in autoclave.

DC A41 E13

IN NECHAEV, E A; ROVENSKII, V T; SOKOL, E I

PA (DNCH) DNEPR CHEM TECHN INST

CYC 1

PI SU 1558911 A 19900423 (199112)\*

ADT SU 1558911 A SU 1988-4404461 19880112

PRAI SU 1988-4404461 19880112

IC C07D307-50

AB SU 1558911 A UPAB: 19930928

Proposed method comprises treatment of vegetable at 20-60 deg.C, with H<sub>2</sub>SO<sub>4</sub> soln. in amt. 0.7-2.8 per wt. of absolutely dry starting material, equal to the value of active ash content of starting material and distributed in 2-3.6 times its amt. of water, in volume corresp. to that of stationary liq.; washing with 2-3.6 times its amt. of water, removing the excess, impregnation with 2-3.6 times its amt. of 0.5-1.5% H<sub>2</sub>SO<sub>4</sub> soln., removing excess acid and treatment with **steam** at 170-175 deg.C in an autoclave, with **furfural** distilled off for 60-90 mins.

Tests show that the proposed method increases the yield of **furfural** to 76.2-82.1% (i.e. by 1.4 times compared to the known method). The duration of the stage of distn. and collection of produced **furfural** is reduced to 60-90 mins. i.e. by 50%, compared to the known method.

**USE/ADVANTAGE** - **Furfural** is used as solvent and as starting material in prodn. of plastics. Increased yield of prod. and reduced duration of distn. Bul.15/23.4.90

0/0

FS CPI

FA AB; DCN

MC CPI: A01-E10; E07-A01

L80 ANSWER 10 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1989-214067 [30] WPIX

DNC C1989-095167

TI **Furfural** prodn. from **pentosan**-contg. raw material - by passing raw material suspension in sulphuric acid into flow reactor, and passing reaction mixt. into pressure releasing evaporator.

DC E13

IN ZEITSCH, K J

PA (KRUPP) KRUPP GMBH FRIED

CYC 5

PI DE 3842825	A 19890720 (198930)*	9p
FI 8806014	A 19890709 (198940)	
ZA 8900080	A 19891025 (198947)	
US 4912237	A 19900327 (199018)	
DE 3842825	C 19910124 (199104)	
CH 678183	A 19910815 (199138)	

ADT DE 3842825 A DE 1988-3842825 19881220; ZA 8900080 A ZA 1989-80 19890105;  
US 4912237 A US 1989-295314 19890109

PRAI DE 1988-3800317 19880108; DE 1988-3842825 19881220

IC C07D307-50; C13G001-00

AB DE 3842825 A UPAB: 19930923

**Furfural** is prep'd. from **pentosan**-contg. raw materials by hydrolysis and dehydration in an acid medium in a process in which a suspension of the comminuted raw material in dil. H<sub>2</sub>SO<sub>4</sub> is passed continuously to a flow reactor where it is mixed with high pressure steam to raise the tmepl. to 170-230 deg.C, esp. 210-230 deg.C then the reacted suspension is cooled in a heat exchanger to 140-200 deg.C and passed via a valve into a pressure release evaporator in which the prevailing press is less than or equal to 1012 hPa (760 Torr), pref. 67-267 hPa (50-200 Torr) to separate the **furfural** formed and the resulting **furfural**-water vapour mxit., either directly or after condensn., is subjected to conventional distn..

**USE/ADVANTAGE** - The process allows continuous industrial scale prodn. of **furfural** from raw materials such as bagasse, oat husks, corn cob residues, wood waste and straw in very short reaction times and with very little polymerisation of the prod. yields are much higher than in prior art processes and the ratio of reactor space to prodn. rate is considerably lower. The residual suspension is dewatered and the still hot dil. acid extracted is recirculated to the reaction stage. The solid

residual material recovered has a low moisture content and a low acid content.

0/3

FS CPI

FA AB; DCN

MC CPI: E07-A01

ABEQ DE 3842825 C UPAB: 19930923

**Furfural** is mfd. from raw materials contg. pentosane by a process in which the crushed raw material, e.g. wood pulp is continuously fed as a suspension with dil. H<sub>2</sub>SO<sub>4</sub> to a flow reactor at 170-230 deg.C for mixing with high pressure steam. Reacted suspension passes into a heat exchanger for cooling to 140-200 deg.C and then through a valve of a flash vaporiser, where pressure is adjusted to less than a equal to 1013 kPa. The water-**furfural**-steam mixt. is condensed or supplied direct for distillation.

ADVANTAGE - Highest possible **furfural** concn. with minimum capital and prodn. costs.

ABEQ US 4912237 A UPAB: 19930923

**Furfural** is made by (a) passing a suspension of comminuted pentosan-contg. raw material in dil. H<sub>2</sub>SO<sub>4</sub> continuously through a flow reactor, and mixing with high-pressure steam at 170-230 deg.C for residence time to hydrolyse and dehydrate pentosan to **furfural**.

Process then comprises (b) cooling reacted **furfural**-contg. suspension, discharged from the reactor in a heat exchanger to 140-200 deg.C; (c) passing prod. through a valve into an expansion evaporator maintained at 760 Torr or less to separate residual **furfural**-contg. suspension phase from a water/**furfural** mixed vapour phase; and (d) recovering prod. from vapour phase by distn. opt. after liquefaction.

ADVANTAGE - High concn. of **furfural** is obtd. with min. capital and prodn. costs.

L80 ANSWER 11 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1988-044144 [07] WPIX

DNC C1988-019674

TI Processing lignocellulosic plant material - to produce **furfural** and foodstuff for livestock.

DC C03 D13 E13

IN FRAYER, J Y P; GLIKMANS, G I; LAFONT, S J

PA (FRCS-N) CIE FR ETUD CONS TE; (TECH-N) TECHNIP CIE PR CONS

CYC 3

PI FR 2600063 A 19871218 (198807)\* 14p

BR 8701663 A 19880209 (198811)

CN 87104684 A 19880127 (198911)

ADT FR 2600063 A FR 1986-8448 19860611; CN 87104684 A CN 1987-104684 19870611

PRAI FR 1986-8448 19860611

IC A23K001-14; C07D307-48

AB FR 2600063 A UPAB: 19950110

A process is claimed for treating ligno-cellulosic plant materials (I) to produce partic. **furfural**, by subjecting (I) to **steam** cracking to ensure digestion of (I) and form a pulp contg. insoluble materials such as cellulose and lignin and soluble materials such as pentosanes (II) and pentoses (III). The improvement is that the materials obtd. from the **steam** cracking are washed with water to extract (II) and (III), the washing before done after introducing an acid into these materials so as to increase the solubility of (II) which are then processed to produce **furfural**, while the residue of the washed insoluble materials is sepd. and used as foodstuff for livestock.

Pref. the acid in phosphoric or **acetic acid** used at 0.5-5 wt% of the solids equiv. of the material leaving the **steam** cracking plant.

ADVANTAGE - The process enables the prodn. of both **furfural**

and foodstuff for livestock.

0/2

Dwg.0/2

FS CPI

FA AB; DCN

MC CPI: C04-A07D5; C07-A01; C12-L09; D03-G04; E07-A01; N04

L80 ANSWER 12 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1986-100817 [16] WPIX

DNC C1986-043217

TI Cellulose and **furfurol** prepns. from cellulose-contg. material - by pre-hydrolysis with dil. acid to convert **pentosan** to pentose followed by chemical dehydration of pentose to **furfurol**.

DC E13 F09

IN KNAUTH, I

PA (KNAU-I) KNAUTH H

CYC 1

PI DE 3435451 A 19860410 (198616)\* 6p

PRAI DE 1984-3435451 19840927

IC C07D307-50; D21C003-04

AB DE 3435451 A UPAB: 19930922

The material to be decomposed is **heated** with a dil. acid below 150 deg.C, until the **pentosans** are hydrolysed to pentoses. After adding a cpd. causing dehydration, the compsn. is **heated** quickly above 160 deg.C, until decompn. is completed, and the **furfurol**, forming from the pentoses, is discharged.

ADVANTAGE - **Furfurol** yields reach at least 60% of the theoretical. The dehydration of the pentoses to **furfurol** does not affect cellulose decompn. The hydrolysis of the **pentosans** to pentoses is completed before decompn. and side-reactions with **furfurol** are prevented. The pre-hydrolysis sugars are not extd. and the **furfurol** concn. in the final condensate is at least 10%, whereby energy consumption and appts.-investment are reduced.

0/0

FS CPI

FA AB

MC CPI: A01-E14; E07-A02E; F05-A02A; F05-A02C

L80 ANSWER 13 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1984-257462 [42] WPIX

DNC C1984-108874

TI **Furfurol** and glucose prodn. from cellulose contg. material - by hydrolysis in two stages with different acid concns..

DC D17 E13 E17

IN KNAUTH, I

PA (KNAU-I) KNAUTH H

CYC 1

PI DE 3312450 A 19841011 (198442)\* 6p

DE 3312450 C 19850207 (198507)

ADT DE 3312450 A DE 1983-3312450 19830407

PRAI DE 1983-3312450 19830407

IC C07D307-50; C13K001-02

AB DE 3312450 A UPAB: 19930925

Two-stage method for making **furfural** (I) and glucose (II) by acid hydrolysis of cellulose-contg. material comprises first impregnating with dil. acid. The acid is then conc. by drying so that hydrolysis of **pentosans** to pentose occurs at below 100 deg.C. Then the acid is further conc. by additional **heating** so that pentoses are dehydrated at about 100 deg.C to form (I).

ADVANTAGE - The **pentosan** concn. in the first stage prod. is so high that (I) formed by dehydration can be recovered, without loss, by direct evapn. Substances such as **acetic acid**, formed in the first stage, are removed during drying, so that subsequent

reaction is facilitated.

0/0

FS CPI

FA AB

MC CPI: D05-B; D06-G; E07-A01; E10-A07

ABEQ DE 3312450 C UPAB: 19930925

Two-stage method for making **furfural** (I) and glucose (II) by acid hydrolysis of cellulose-contg. material comprises first impregnating with dil. acid. The acid is then conc. by drying so that hydrolysis of **pentosans** to pentose occurs at below 100 deg.C. Then the acid is further conc. by additional heating so that pentoses are dehydrated at about 100 deg.C to form (I).

ADVANTAGE - The **pentosan** concn. in the first stage prod. is so high that (I) formed by dehydration can be recovered, without loss, by direct evapn. Substances such as **acetic acid**, formed in the first stage, are removed during drying, so that subsequent reaction is facilitated.

0/0

L80 ANSWER 14 OF 18 WPIX (C) 2003 THOMSON DERWENT

AN 1984-225445 [36] WPIX

DNC C1984-095162

TI Hydrolysis of cellulosic or starch materials - to form reducing sugars, using acetone with minor amts. water and acid catalyst.

DC C03 D13 D17

IN PASZNER, L

PA (OSHA-I) OSHAUGHNESSY J P; (PASZ-I) PASZNER L

CYC 17

PI WO 8403304 A 19840830 (198436)\* EN 41p

RW: AT BE CH DE FR GB LU NL SE

W: AU BR DE GB JP SU

AU 8425779 A 19840910 (198449)

EP 138882 A 19850502 (198518) EN

R: AT BE CH DE FR GB LI LU NL SE

HU 34777 T 19850429 (198526)

AU 8433096 A 19860327 (198620)

CA 1230592 A 19871222 (198808)

CN 1082115 A 19940216 (199522)

C13K001-00

ADT WO 8403304 A WO 1984-US213 19840216; EP 138882 A EP 1984-901147 19840216;

CN 1082115 A CN 1992-108976 19920730

PRAI HU 1983-545 19830216

REP 2.Jnl.Ref; CA 1118772; DE 2142362; FR 2400557; WO 8203409

IC A23J001-12; C07G001-00; C07G007-00; C13D001-14; C13K001-02; D21C003-04

AB WO 8403304 A UPAB: 19930925

Prodn. of reducing sugars (I) from carbohydrate materials (II) (comminuted cellulosic materials contg. lignin and/or starch-contg. cereal grains or tubers) involves treatment with H<sub>2</sub>O/**Me<sub>2</sub>CO**/ acid catalyst at high **temp./high pressure**. The improvement is as follows: (a) the hydrolysis liq. contains at least 70 vol. % **Me<sub>2</sub>CO**, H<sub>2</sub>O, and an acid catalyst; (b) the comminuted (II) is treated for a limited time at elevated **temps.** until it is at least partially dissolved and at least 90 % of the solubilised sugars from those potentially available are dissolved (without degradation to non-sugars) in the liq.; and (c) the liq. is rapidly cooled as it is removed from the **pressure vessel**.

USE/ADVANTAGE - Use of high **Me<sub>2</sub>CO** concns. in the liq. allows the formation of a stable reaction complex with sugars (I) which prevents, their degradation, accelerates the hydrolysis process, and facilitates sepn. of individual (I). Thus the process may afford high purity, low DP cellulose, as well as protein residues useful as animal feeds, industrial fillers and adsorbents, etc.

0/0

FS CPI

FA AB  
MC CPI: C04-B04A; C04-C02; C04-D01; C12-L09; D03-G04

L80 ANSWER 15 OF 18 WPIX (C) 2003 THOMSON DERWENT  
AN 1984-099882 [16] WPIX  
DNC C1984-042606  
TI **Furfurol** fabricator from vegetable stock - has hydrolyser with vapour cleaner, impeller, and turbine.  
DC E13  
IN KEBICH, M S; MOROZOV, E F; SHKUT, V M  
PA (BEKI) BELORUSS KIROV TECHN INS  
CYC 1  
PI SU 1028670 A 19830715 (198416)\* 5p  
ADT SU 1028670 A SU 1980-2986626 19800917  
PRAI SU 1980-2986626 19800917  
IC C07D307-50  
AB SU 1028670 A UPAB: 19930925  
The fabricator comprises a hydrolyser (1) with a neck (2), a heat carrier feed pipe, and a vapour discharge pipe which is a cleaner inside hydrolyser (1). For treatment in an ascending stream of heat carrier at 160-170 deg. C and 0.6-0.8 MPa in the presence of 10-15 per cent concn. sulphuric acid totalling 20-30 per cent of the absolutely dry stock weight, the vapours are taken off at a mass velocity of 2.04-4.40 t/h per m<sup>2</sup> of cross section of hydrolyser (1).

The vapour cleaner is made as a casing (4) with slits and guide blades on its lateral surface and housing an impeller (7) on the shaft, and a subsequent turbine (9). The vapours formed at 7-10 gauge atmospheres enter the top of casing (4) and rotate impeller (7) and turbine (9). The substantial pressure drop (4-5 gauge atmospheres) between hydrolyser (1) and the vapour converter, increases the speed of impeller (7) and thus the velocity of the vapours passing between casing (4) and inverted cone (12). Thus the centrifugal forces are increased in a 1.3-litre reactor on treatment of the stock for 90-120 minutes. Bul.26/15.7.83.

2/2

FS CPI  
FA AB  
MC CPI: E07-A01

L80 ANSWER 16 OF 18 WPIX (C) 2003 THOMSON DERWENT  
AN 1984-028143 [05] WPIX  
DNC C1984-012316  
TI Prepn. of furfural - by hydrolysis of pentosan-contg. material over catalyst consisting of zirconium di oxide and sulphuric acid.  
DC A41 E13  
IN KRUPENSKII, V I  
PA (UKHT-R) UKHTA IND INST  
CYC 1  
PI SU 1006436 A 19830323 (198405)\* 2p  
ADT SU 1006436 A SU 1981-3331257 19810612  
PRAI SU 1981-3331257 19810612  
IC B01J021-06; C07D030-50  
AB SU 1006436 A UPAB: 19930925

Furfural is prep'd. by hydrolysis of pentosan-contg. plant raw material at 160-170 deg. C and 3-8 kg per sq.cm. pressure, in the presence of 0.6-0.8% catalytic soln. of Group IV metal dioxide in 3-5% H<sub>2</sub>SO<sub>4</sub>. The soln. consists of 30-35% wt. of the starting material. The yield of furfural is increased by using ZrO<sub>2</sub> as the group IV cpd.

0/0

FS CPI  
FA AB

MC CPI: A01-E10; E07-A01; N03-B

L80 ANSWER 17 OF 18 WPIX (C) 2003 THOMSON DERWENT  
 AN 1983-26915K [11] WPIX  
 DNC C1983-026376

TI Mfr. of **furfural** from **pentosan**-contg. green-wood - by hydrolysis of wood pulp at elevated **temp.** and **pressure** in presence of **acetic acid**.

DC E13  
 IN FEDOTOVA, S A; MELNIKOV, N P; TSIRLIN, Y U A  
 PA (GIDR-R) GIDROLIZPROM RES

CYC 1  
 PI SU 925955 B 19820507 (198311)\* 2p  
 PRAI SU 1979-2821001 19790724

IC C07D307-50

AB SU 925955 B UPAB: 19930925

**Furfural**, used in organic and polymer chemistry, is prep'd. in the increased yield, by hydrolysis of **pentosan**-contg. vegetable raw material at 183-185 deg. C and 10-10.5 kg per sq.cm. **pressure** in the presence of 15-20% AcOH.

Typically 100 g of crushed birch and aspen greenwood (contg. potentially 15-16% **furfural** at 45% moisture content) is soaked with 15% AcOH soln. (15-20% of the wt. of dry raw material) is hydrolysed with **steam** at 183-185 deg. C and 10-10.5 kg per sq.cm. **pressure**.

The **furfural**-contg. **vapour** is condensed and the condensate rectified yielding 8.2% of 99.5% prod. based on the wt. of dry raw material. The hydrolysis proceeds for 90-100 min. Bul.17/7.5.82

FS CPI

FA AB

MC CPI: E07-A01

L80 ANSWER 18 OF 18 WPIX (C) 2003 THOMSON DERWENT  
 AN 1983-03982K [02] WPIX  
 DNC C1983-003955

TI Prepn. of **furfural** for polymer synthesis - by impregnating timber with sulphuric acid, hydrolysis, **steam** distillation of residue under **pressure**, and hexose hydrolysis.

DC A41 E13

IN DMITRENKO, L V; MELAMED, T S E; MELNIKOV, N P  
 PA (HYDR-R) HYDROLYSIS IND SCI

CYC 1

PI SU 910631 B 19820307 (198302)\* 2p

PRAI SU 1978-2734460 19781213

IC C07D307-50

AB SU 910631 B UPAB: 19930925

**Furfural** (I) is obtd. from **pentosan**-contg. material (II) such as birch or aspen more efficiently and corrosion of the Ti hydrolysers reduced when (II) is treated with 0.95-1.2% H<sub>2</sub>SO<sub>4</sub> in the hydrolyser, then the liquid squeezed out with **compressed** air or live **steam** under the **pressure** of 1.5-2 to 4-5 kg/sq.cm.

The liquid phase is re-routed for use at the head of the process, and the residue acted upon by live **steam** under the **pressure** of 9-11 kg/sq.cm. and 180 deg. C. The **steam** contg. (I) is taken off from the hydrolyser top and condensed. After this the residue is **reheated** to 180 deg. C with live **steam**, 0.5-0.6% H<sub>2</sub>SO<sub>4</sub> added and hexose hydrolysis carried out under the **pressure** of 9-12 kg/sq.cm. the hydrolysate taken off from the bottom and lignin residue removed from the hydrolyser. Bul. 9/7.3.82.

FS CPI

FA AB

MC CPI: A01-E10; E07-A01

=> d his

(FILE 'HOME' ENTERED AT 16:41:52 ON 16 FEB 2003)  
SET COST OFF

FILE 'REGISTRY' ENTERED AT 16:42:06 ON 16 FEB 2003  
E FURFURAL/CN

L1 1 S E3  
L2 1 S PHOSPHORIC ACID/CN  
L3 1 S ACETIC ACID/CN

FILE 'HCAPLUS' ENTERED AT 16:43:08 ON 16 FEB 2003

L4 14433 S L1  
L5 18796 S FURFURAL  
L6 8325 S FURALDEHYDE OR FURFURALDEHYDE OR FURFUROL# OR FUROLE OR ALPHA  
L7 1207 S 2() (FURANCARBALDEHYDE OR FURANCARBONAL OR FURFURAL OR FURFURA  
L8 1863 S 2 FURANCARBOXALDEHYDE  
L9 158 S FURAN 2 CARBOXALDEHYDE  
L10 24 S FURFURLALDEHYDE  
L11 25 S 2 FURAN CARBOXALDEHYDE  
L12 9 S 2 FURYL ALDEHYDE  
L13 51 S FURAN 2 ALDEHYDE  
L14 28529 S L4-L13  
L15 817 S L14 AND PENTOSAN?  
E PENTOSAN/CT  
E E5+ALL  
L16 1348 S E4  
L17 172 S L14 AND L16  
L18 817 S L15,L17  
L19 110 S L18 AND ?PRESSUR?  
L20 152 S L1/P AND L18  
L21 30 S L20 AND L19  
L22 38 S L20 AND STEAM?  
L23 22 S L20 AND (?VAPOR? OR ?VAPOUR?)  
L24 57 S L20 AND (TEMPERATURE OR HEAT? OR THERM?)  
L25 85 S L21-L24  
L26 1 S L25 AND DEPRESSUR?  
E REACTOR/CT  
L27 58 S E9+NT AND L14  
L28 8 S L27 AND ?PRESSUR?  
SEL DN AN 1 6  
L29 2 S E1-E6  
L30 610 S L14 AND ?SACCHARIDE?  
E POLYSACCHARIDES/CT  
E E3+ALL  
L31 127 S E4,E3 AND L14  
L32 1353 S L18,L30,L31  
L33 241 S L32 AND L1/P  
L34 39 S L33 AND ?PRESSUR?  
L35 23 S L34 AND (STEAM? OR ?VAPOR? OR ?VAPOUR?)  
L36 24 S L26,L29,L35  
L37 3 S L36 AND (L2 OR L3 OR PHOSPHORIC ACID OR ACETIC ACID OR H2PO4)  
L38 15 S L36 AND ?HEAT?  
L39 15 S L34 AND ?STEAM?  
L40 24 S L36-L39  
E ZEITSCH K/AU  
L41 33 S E3-E9  
E EPOPL H/AU  
L42 8 S L41 AND L14  
L43 7 S L1/P AND L42  
L44 29 S L40,L43

L45 1 S L42 NOT L44  
 L46 30 S L44, L45  
 L47 30 S L46 AND (?STEAM? OR ?HEAT? OR TEMPERATURE OR ?THERM? OR ?STEA  
 L48 6 S L47 AND (?BOIL? OR EBULL?)  
 L49 1 S L47 AND ?COMPRES?  
 L50 30 S L47-L49  
 L51 30 S L50 AND L4-L50  
 SEL HIT RN

FILE 'REGISTRY' ENTERED AT 17:01:41 ON 16 FEB 2003  
 L52 2 S E1-E2

FILE 'REGISTRY' ENTERED AT 17:02:22 ON 16 FEB 2003

FILE 'HCAPLUS' ENTERED AT 17:02:37 ON 16 FEB 2003

FILE 'WPIX' ENTERED AT 17:03:05 ON 16 FEB 2003  
 E WP2000-ZA24/AP, PRN  
 E WO2000-ZA24/AP, PRN

L53 1 S E3  
 E DE99-19905655/AP, PRN  
 L54 1 S E3, E4  
 L55 1 S L53, L54  
 L56 35 S C07D307-50/ICI, ICM, ICS  
 L57 2893 S L5-L13  
 E FURFURAL/DCN  
 E E3+ALL  
 L58 518 S E2 OR 0661/DRN  
 L59 3057 S L57, L58  
 L60 50 S L59 AND N161/M0, M1, M2, M3, M4, M5, M6  
 L61 71 S L59 AND N421/M0, M1, M2, M3, M4, M5, M6  
 L62 284 S L59 AND N513/M0, M1, M2, M3, M4, M5, M6  
 L63 85 S L59 AND N514/M0, M1, M2, M3, M4, M5, M6  
 L64 53 S L57 AND PENTOSAN/BIX  
 L65 27 S L57 AND L56  
 L66 111 S L60, L64, L65  
 L67 46 S L66 AND L62, L63  
 L68 19 S L67 AND L61  
 L69 15 S L68 AND E07-A01/MC  
 L70 13 S L69 NOT LEVULINIC/TI  
 L71 13 S L55, L70  
 L72 4 S L68 NOT L69  
 SEL DN AN 2 3  
 L73 2 S L72 AND E1-E4  
 SEL DN AN 4 L72  
 L74 1 S E5-E6  
 L75 16 S L71, L73, L74 AND L53-L74  
 L76 16 S L75 AND (?STEAM? OR GAS? OR ?HEAT? OR TEMPERATURE OR REACTOR  
 L77 4 S L76 AND (ME2CO OR ACETIC ACID OR 0247/DRN OR R00247/DCN)  
 E ZEITSCH K/AU  
 L78 17 S E3, E4  
 E EPOPL H/AU  
 L79 4 S L78 AND L59  
 L80 18 S L76, L77, L79 AND L53-L79

FILE 'WPIX' ENTERED AT 17:19:05 ON 16 FEB 2003